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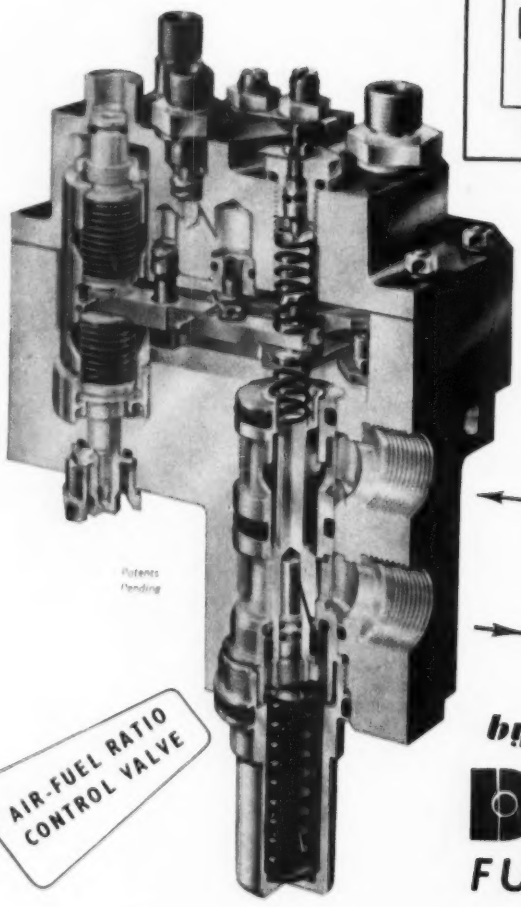

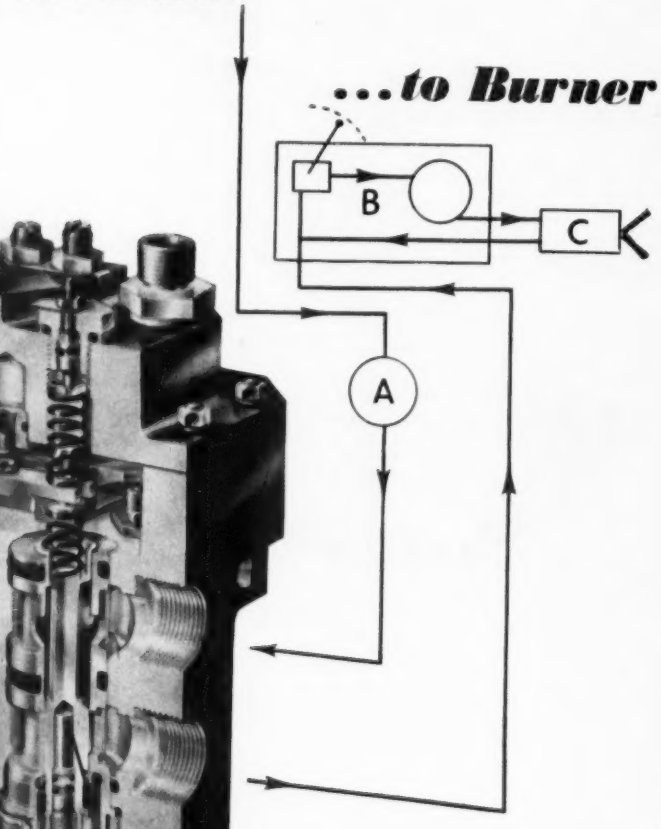

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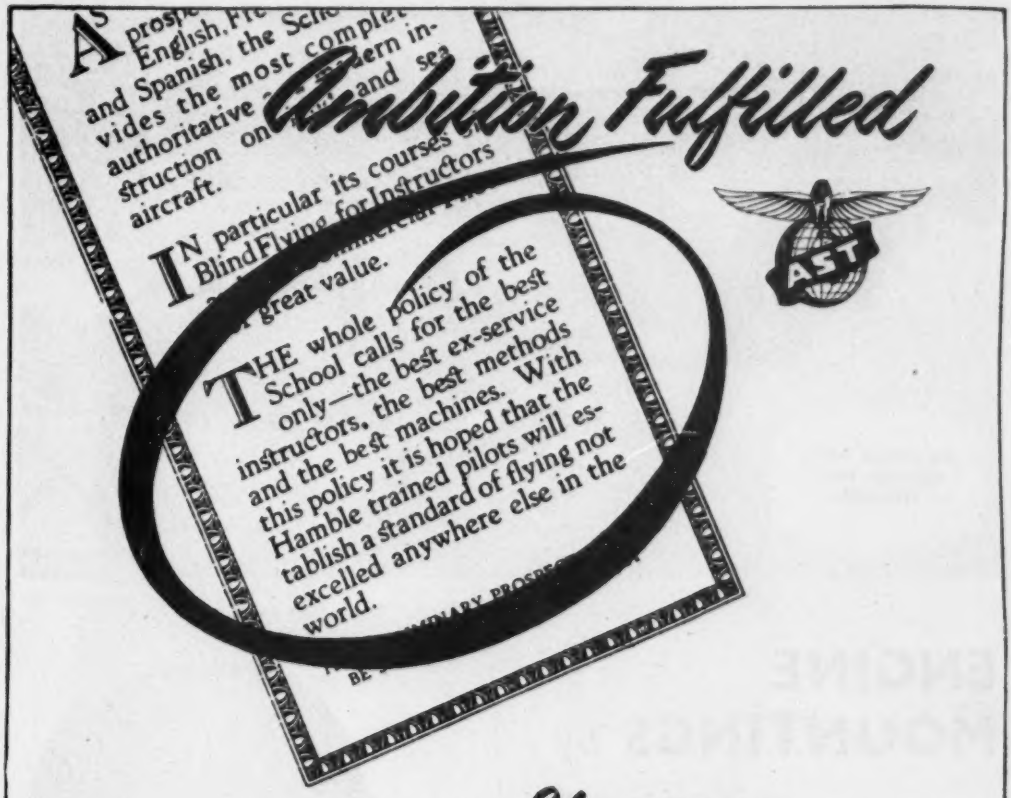
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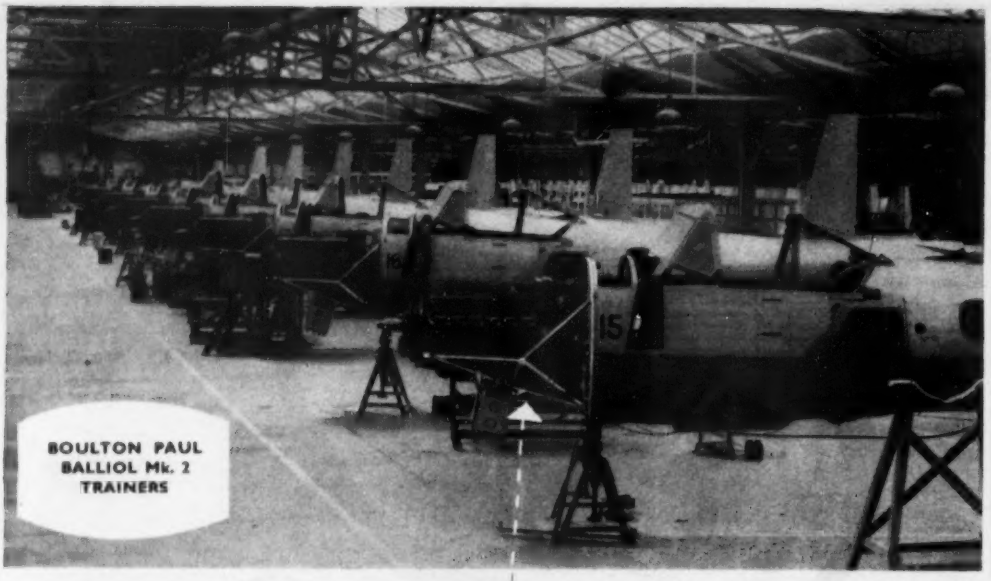

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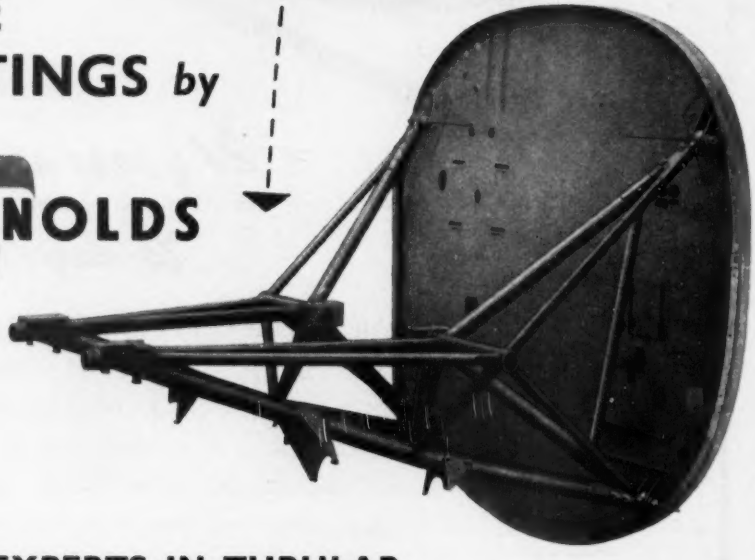

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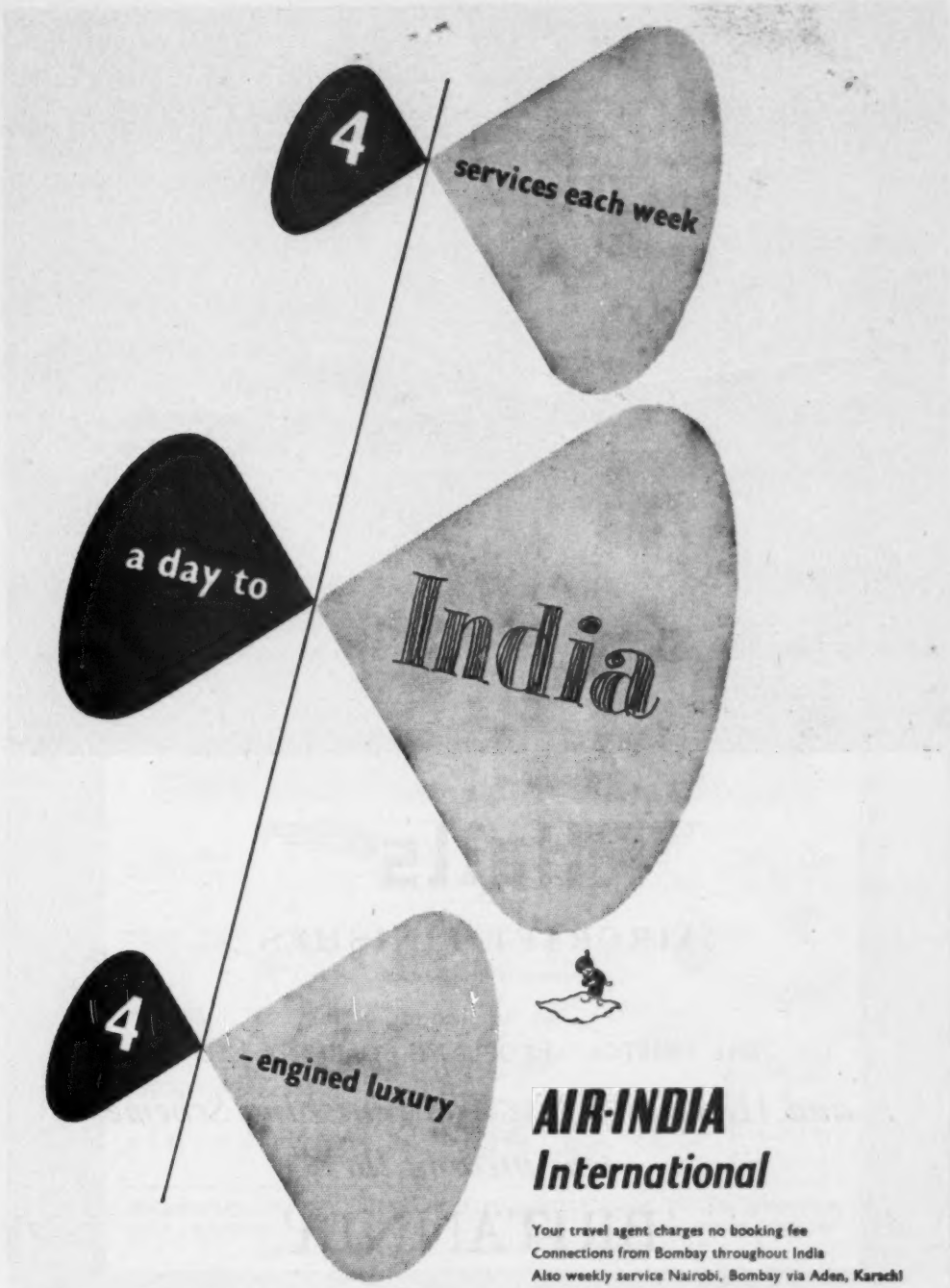

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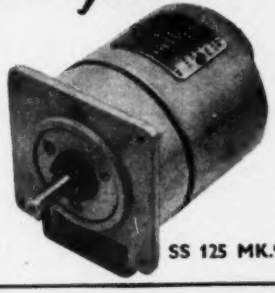

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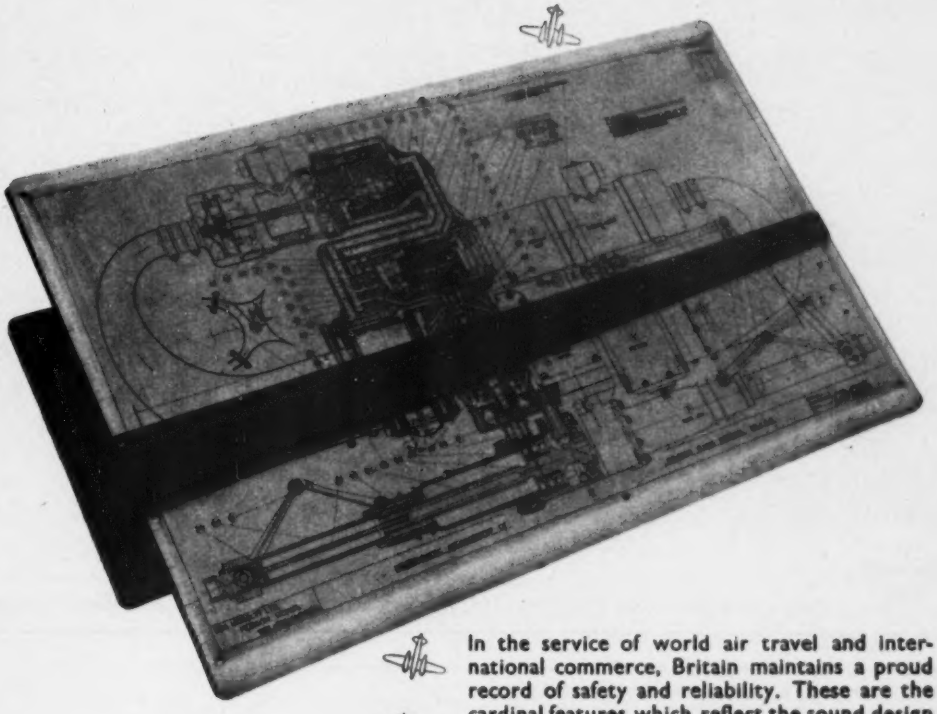

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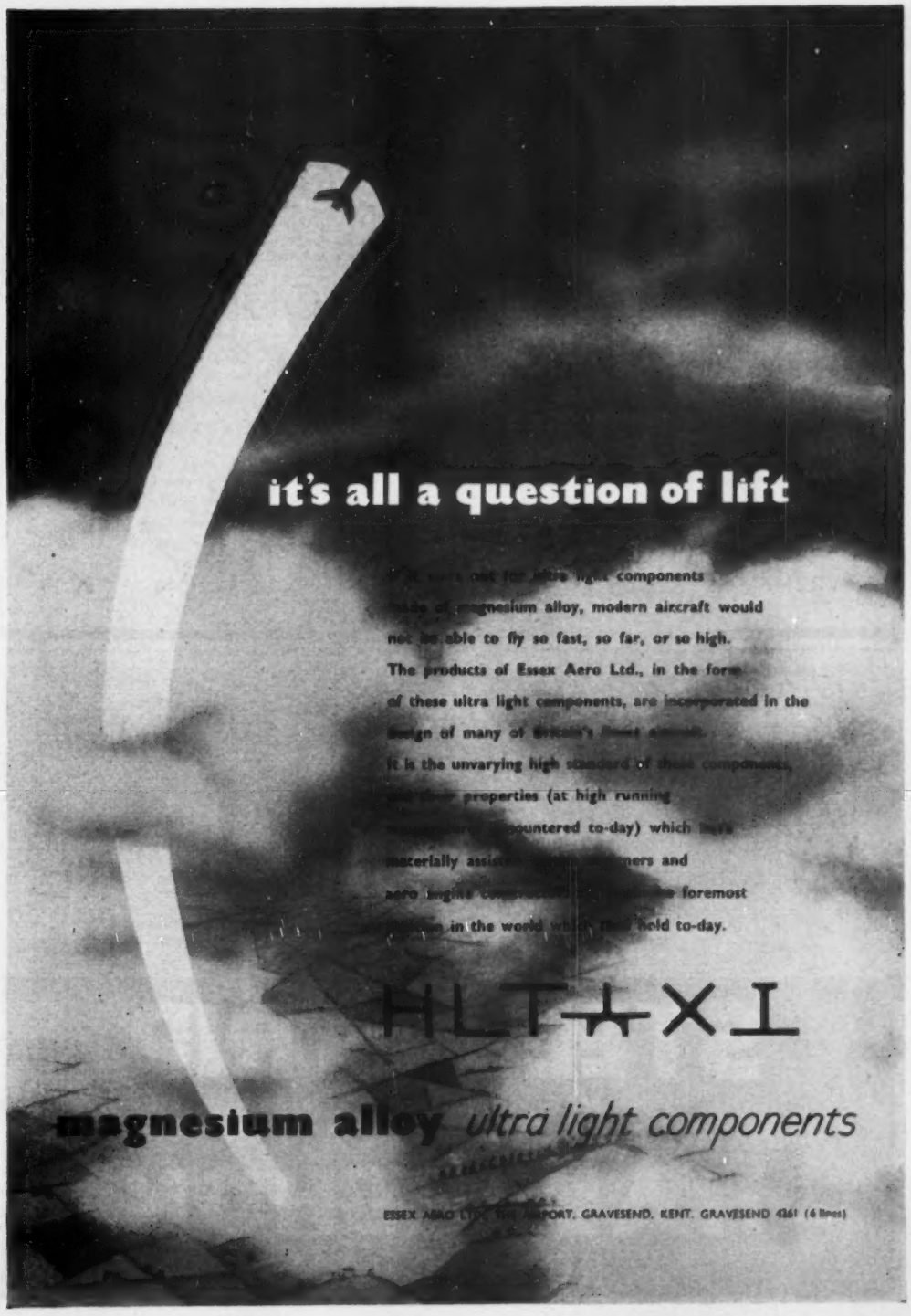
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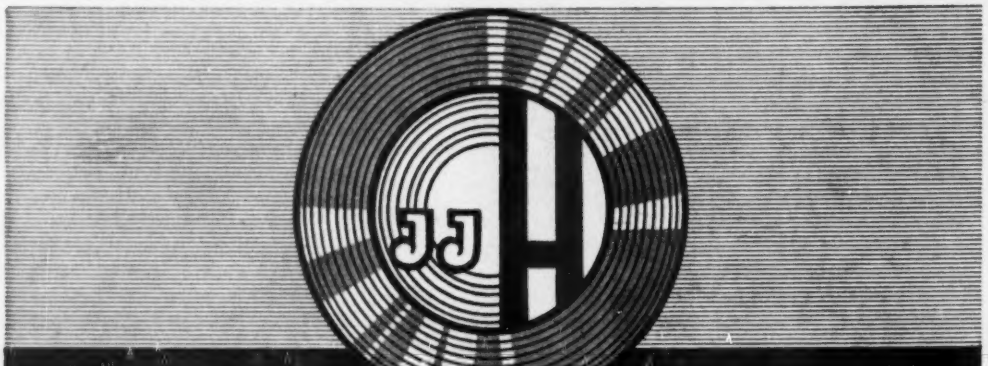

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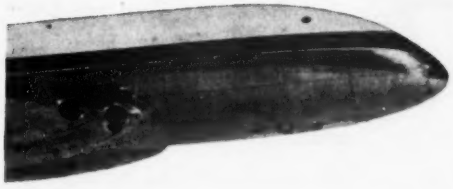

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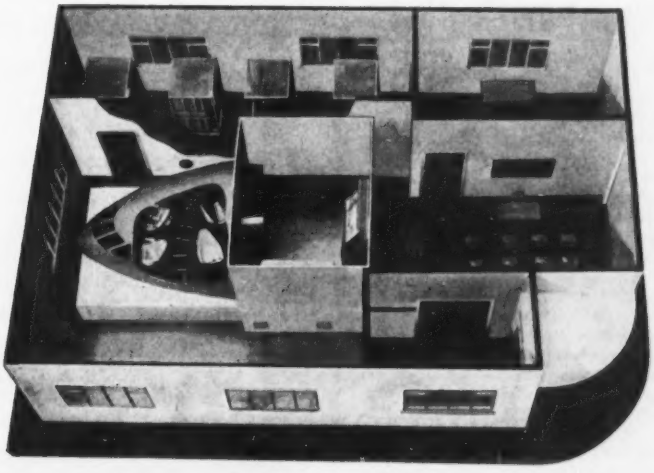

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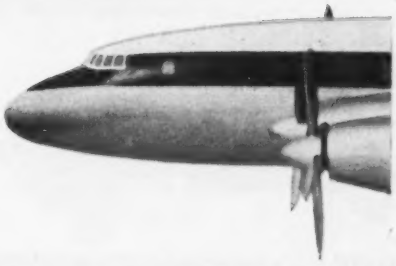

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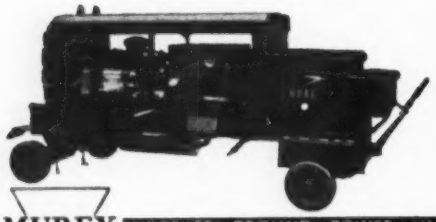

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A Full House

CUSTOMARILY, the S.B.A.C. Exhibition is referred to as the shop window of the British aircraft industry, and certainly its primary purpose is to show a great gathering of guests from this country and abroad just what the British manufacturers have achieved and what superlative wares they have to offer. This year some 15,000 official guests from abroad, as well as many thousands more from at home, were invited to attend this unique function. Today, Friday, and during the public days at the week-end, it is to be hoped that the numbers travelling to Farnborough will extend into the hundreds of thousands, there to share in the excitement and pride which the aircraft industry justifiably feels in its aircraft and the prowess of its test pilots.

Supersonics, the awesome approach of the Avro 698, the grace of the Princess, the scream of Sapphire or Olympus in the Canberras, the silent and unexpectedly agile performance of the Britannia, the sheer speed of the Hunter, Swift and D.H. 110, the roar and crackle of afterburners, the businesslike twirls of the 173 and Skeeter helicopters, the inverted flick rolls of the little Aiglet . . . but we could continue to enthuse in this way until there was no more left to report on pages 306-312.

Where production is concerned, the accent at this time must be on exports. Mr. Churchill himself has confirmed that military and civil aeroplanes are among the country's most valuable sources of dollars and other foreign currency, and that as such they will, in some instances, earn priority equal to, or even greater than, that of military equipment for our own rearmament. Only a steady flow of orders for all kinds of civil as well as military types will enable the country to maintain a strong, well-balanced aircraft industry. It is reasonable to hope, too, that a fair proportion of the orders for civil aircraft will continue to be placed by home operators, including the independent airline companies.

Aviation experts of some 70 different nationalities are among those who have come to see our aircraft this week; we recall that in one well-known card game, to see an opponent's hand may be an attempt to call his bluff. Though the stakes are high, this nation need have no fears about exposing its cards, for while perhaps there may not be a royal flush to lay down, there is at least a full house—and one that is aces high. Our high-priority military orders include a trio of fine fighters and a brace of exceptional bombers—the latest, the Avro 698 four-jet delta, having already captured the imagination of all who have seen or even heard of it. In the civil pack there are the three best airliners flying today—all turbine-powered—and a choice of desirable pairs among freighters, feeder-liners, helicopters, and light aircraft. All these have the quality which we now need in quantity. The news of a production order for the military Blackburn Universal is particularly welcome at this time, both in itself and because of the possibilities it opens up for other civil orders.

Customers from abroad will not fail to have noticed that, by comparison with American or even European prices, the costs of British aircraft—military and civil—are low. Whether a country needs jet airliners or fighters, the available money is likely to go considerably farther if spent on aircraft seen at Farnborough than on any to be obtained across the Atlantic. Some people in America who are understandably slow to see the reasoning behind so-called off-shore purchases of aircraft should ponder this fact. Moreover, British day and night fighters built in Holland and Italy, for example, may tap American generosity much less heavily than would the sending of an equivalent number of machines from the United States to fortify the smaller Allies.

In the last few weeks the possibility of American operators buying Comets has been a much-discussed topic, but there seems to have been little solid backing for some extravagant newspaper reports. Rather have their columns been used as spurs to American manufacturers. We believe that certain of the major American operators are ready to order Comets and we believe they would be wise to do so. Hopefully we watch such men as Mr. Juan Trippe. With remarkable courage such companies as de Havilland and Vickers have already committed themselves (and their shareholders) to the limits in order to meet firm and probable orders, and any further extension and speeding-up of production can only be justified by further firm orders. We may revert to our earlier simile to remark that there might be an extra card to consider—the joker (or Rickenjoker, perhaps). It can either be outside the pack or, according to the particular game that is being played, the wild card, which can match the ace.

FROM ALL QUARTERS

Avro's Mighty Delta Emerges

WHAT has been an open secret for many months past was officially released from the security veil last week-end when the Avro 698 delta bomber (four Rolls-Royce Avons) made its maiden flight from the makers' Woodford (Cheshire) Airfield on August 30th. Flown by W.C. "Roly" Falk, A. V. Roe's chief test pilot, it was airborne for 35 minutes. "Even on this first flight I have been able to carry out a variety of manœuvres, and I am very happy with the aircraft's performance generally," said Falk after landing.

Commenting on the flight, Mr. Duncan Sandys, Minister of Supply, said that the advent of the 698 might well have a profound influence upon future development not only in air warfare but in civil transport. "The Government decided recently to order an appreciable number of these new bombers without waiting for the prototype to carry out the usual flying trials," he continued. "I am confident that both on military and economic grounds our decision will prove to be justified.

"The bold decision to adopt the triangular wing for an aircraft of this size and to dispense with the tailplane was an act of faith for which the designers and manufacturers deserve the highest praise.

"The dart-like form of this new machine offers the important advantage of reducing wing-loading and drag, and provides much increased stowage space for fuel or pay-load. This will enable it to attain a speed approaching the speed of sound and to carry a very large bomb load over great distances. It is, moreover, designed to fly at altitudes which will give it a considerable degree of immunity from ground and air defences."

Said Sir Roy Dobson, Avro's managing director : "Every claim and theory we have advanced in favour of the delta design has been conclusively proved in the research programmes laid down for our other deltas, the Avro 707A and B, which were ordered by the Ministry of Supply so that we could substantiate our somewhat revolutionary claims for a bomber. This has been done and the full-size aircraft will soon be handed over for official trials."

The only incident during the maiden flight was one of a kind not entirely unknown on such occasions—some trouble with the nosewheel doors. It ended with the shedding of both doors, but there was no structural damage, and after two pilots—one in the 707A and the other in a Vampire—had been up to have a close look, Falk was assured by R/T that all was well for landing. The big bomber streamed a ribbon tail-parachute on touching down. On Monday last the 698 flew to Boscombe Down, preparatory to S.B.A.C. Display visits; it took 20 minutes for the journey of some 166 miles.

FASTER, HIGHER, FARTHER, HEAVIER: The Avro 698 on its first flight. An extended air-brake can be seen above the starboard wing, and others are visible below both wings. Note the eight-wheel main undercarriage and twin nose wheel. The four Avons aspirate through wing-root intakes similar in shape to those of the 707A. On the left is "Roly" Falk, pilot on the maiden flight.

Loss of the P.120

LESS happy news of another new delta—one that was expected to be a star performer at Farnborough—is tempered by the fact that Boulton Paul test pilot "Ben" Gunn escaped unscathed when the P.120 research aircraft crashed at Grateley, near Andover last Friday, during a flight from Boscombe Down.

First reports—one of them mentioned the Javelin—suggested that two machines were involved, for the P.120's tail unit was found some 30 miles away. Gunn was able to open his canopy and operate his ejector seat; he parachuted into a wood, extricated himself from a tree, and within a few minutes was examining the main wreckage and seeking a telephone.

Like its predecessor, the P.111, the P.120 was powered by a Rolls-Royce Nene. Whereas the 111, as seen at Farnborough last year, had a fin and rudder only, the 120 also had a tailplane.

Graceful Tributes

AMERICAN Press reaction to the Canberra's Atlantic records and, by implication, to Britain's jet progress in general, has been distinctly generous.

In spite of Presidential Election news, the Canberra story found a place on many front pages. The *New York Times* congratulated the crew and the British Nation—"which, having lost the mythical blue ribbon of the Atlantic to the S.S. *United States*, has nailed a different and more modern ribbon to its mast. It marks a new triumph for the British jet-plane industry, which appears to be assuming the lead in the Western World in both military and commercial aircraft—and it is a comfort that it is on our side."

This last thought was echoed in the *San Francisco Chronicle:* "We can be glad that so elusively fast and potentially destructive an airplane is on our side and that in fact the production of American models of the Canberra is to get under way."

Said the New York *World Telegram and Sun:* "It was a stunt, yes, but a useful one. It dramatises the age in which we live. It gives our own plane designers, builders and flyers something to shoot past—not just at. Our applause to the British and thanks for the competition."

New York's *Daily Mirror* commented candidly: "Without meaning to sound sourgrapeish we would like to ask, 'Where the hell is the United States?' Somewhere along the line, governmentally, militarily, commercially, we have let the British get way out ahead in jets. Pan-American World Airways is considering placing orders in Britain. This does not speak well for our illusion of American air power, either military or commercial. Anyway, congrats to the British."

Pilot and President

ONE of the most celebrated of America's airline executives, Capt. Eddie Rickenbacker, was received with fitting ceremony when he arrived in London on Wednesday of last week. Apart from his status as president and general manager of Eastern Air Lines, the operators of important routes down the eastern seaboard of North America, Capt. Rickenbacker is famed for his fighting exploits in both world wars : in the Kaiser's War, flying Spads during a relatively short tour of duty in France, he accounted for 26 enemy aircraft.

Arriving with half a dozen senior executives of his company, his first call was at B.E.A.'s big new maintenance base at London Airport—claimed to be the largest pre-stressed concrete structure in the world. His host was Lord Douglas of Kirtleside, B.E.A.'s chairman, supported by Mr. Beverley Shenstone (chief engineer), Mr. Hugh Gordon (chief maintenance engineer) and Mr. Jim

SCALED-UP: *The Avro 698 bears a striking resemblance to the 707A, even to the shape of the cockpit enclosure, but the fact that no tail-pipe has to be accommodated in the rear fuselage adds slimness to the after end. The man alongside gives scale.*

Weedy (B.E.A. works manager at L.A.P.). The visitors were shown round the vast hangers—which are two groups of five, now half completed—and saw Elizabethans and the Viscount 700 and 701.

Later, with Mr. George Edwards (the Viscount's designer) and Mr. Jock Brice (Vickers' chief test pilot) he flew for an hour in the 700, taking the controls for a time and expressing himself as highly appreciative of its handling and smoothness.

On the following day Capt. Rickenbacker visited the Rolls-Royce works at Derby, and his next call was at Filton, in order to see Bristol engine development and the Britannia. On Saturday he flew for 1¼ hours in an Avon-Comet, so by the time he arrived at the S.B.A.C. Show this week he must have had a very fair idea of just how fast British airframe and engine constructors are progressing; certainly Farnborough will have completed the picture for him.

It is, of course, Capt. Rickenbacker's interest in the possibility of obtaining British equipment, that has made the headlines during the past week, and this aspect of his visit is dealt with in our "Civil Aviation" pages in this issue.

N.Z. Race Prospects

IN aviation, as in most other walks of life, immediate affairs are so pressing that there is a natural tendency to put off till tomorrow anything that can be done only with difficulty today—which is, perhaps, the reason why there is still no news of "firm" entries for the England to New Zealand Air Race. The event itself is still over a year distant, but entries close on January 31st next. We may expect to see the lists filling increasingly rapidly during the remaining five months; over 1,000 entry forms have been distributed.

De Havillands have provisionally entered a Comet—probably a Series II—in the Handicap Section, and another Comet entry may come from B.O.A.C. K.L.M. are likely to nominate a DC-6B, a Super Constellation and a Convair. Miss Jacqueline Cochran, the American pilot who competed in the England-Australia Race 18 years ago, may fly the turboprop Convair. An additional inducement to air line operators is that they are to be permitted to carry fare-paying passengers on return flights from New Zealand after the race.

Of Service entries there is still very little news. Mr. George Ward has said that R.A.F. participation is "under consideration"; almost certainly a Canberra would be the choice. (In a leading article some months ago we suggested that the entry of a flight or even a whole squadron might represent a worthwhile exercise in operational mobility.) The U.S.A.F. may be expected to enter one or more of its super-heavies.

The winner of the Speed Section will receive the £1,000 Harewood Gold Cup and £10,000; second, third and fourth prizes are £3,000, £1,000 and £500 respectively. There are similar cash prizes in the Handicap Section.

Full details of the entry conditions were given in *Flight* of February 1st this year.

Helicopters in War

THE B.B.C. is to be congratulated on devoting a period in its Home Service to the subject of flying in helicopters, for it is most desirable that the general public should become better acquainted with the potentialities of these aircraft.

The speaker was Mr. William Courtenay, air correspondent of the *Daily Graphic*, who has had personal experience of the uses to which helicopters are being put in Korea. He started by saying that he was a great believer in the type, largely because over the years he had seen what it could accomplish.

Later, referring to the period he spent in Korea, Mr. Courtenay said that he had watched helicopters in use as staff cars, air ambulances, air/sea rescue craft, and as aircraft for tactical landings. "The first one I saw," he said, "came from one of the U.S. aircraft carriers operating off the south coast of Korea in the first weeks of the war. It landed in the lines of the American Marines at the front and, just like a bird perching on a telegraph wire, it alighted on a disused railway embankment no wider than the track of the helicopter's wheels. To Brigadier-General Craig, the Marine regimental commander, it brought a situation report, revealing all that had transpired on the 150-mile front in the preceding 24 hours.

"I was then a war correspondent and was present in action with these Marines, and realized the value of this information arriving so quickly. Next day I watched the helicopter land again at the same spot; it took Brigadier-General Craig for a look over the front so that he could decide where to set up his headquarters on the lee side of a hill and where to place his artillery in a dry river bed.

"It required only 10 minutes for him to fly to the most forward positions and make this reconnaissance while hovering over the scene. We needed three hours to move in convoy round the winding hills to the same position from where the action was to be fought."

Alcock Memorial Appeal Launched

THE Royal Aero Club has now issued its "appeal to the British aeronautical community" in connection with the proposed memorial to Sir John Alcock and Sir Arthur Whitten Brown, the two Englishmen who, nearly 33 years ago, made the historic first direct flight across the Atlantic. It is thought fitting that a "worthy and permanent memorial should be erected to the two courageous airmen who embarked upon the flight in full knowledge of its hazards." Signed by Lord Brabazon of Tara (R.Ae.C.), Mr. George Dowty (R.Ae.S.), Air Chief Marshal Joubert de la Ferte (Air League of the British Empire) and Mr. J. Lankester Parker (G.A.P.A.N.), the text of the appeal continues :—

"The Royal Aero Club, in collaboration with the other leading British aeronautical organizations, has undertaken to launch an appeal to members of the British aeronautical community for funds to make this possible, and invites your support.

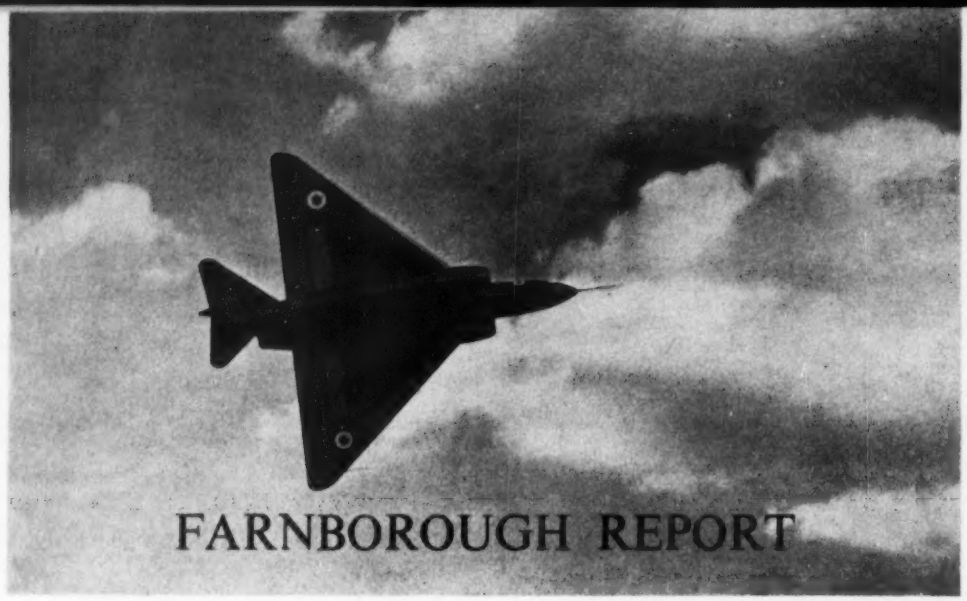
"John Alcock (pilot) and Arthur Whitten Brown (navigator) made that first direct Atlantic flight during the night of June 14th-15th, 1919, in a Vickers Vimy bomber fitted with two 350 h.p. Rolls-Royce engines. The start was made from St. John's, Newfoundland, and some 16 hours 12 minutes later the landing was made at Clifden, County Galway, Ireland. The distance of 1,950 miles had been covered at an average speed of about 120 m.p.h.

"Today, multi-engined airliners carrying up to 60 passengers are constantly crossing the Atlantic at speeds of 300 m.p.h. or more, and still higher speeds are in sight, but the courage of Alcock and Brown in embarking on their historic flight is accentuated by the limited performance of their aircraft and the complete lack of navigational aids then available to them.

"It is felt that no more suitable location for a memorial to Alcock and Brown could be found than the site of the new terminal building at London Airport, where it would be seen by the thousands of passengers departing for, or arriving from, their Atlantic or other long-distance voyages. An admirable position has been allocated by the Ministry of Civil Aviation, and with sufficient support the memorial can be completed and erected in time for the opening of the new terminal buildings.

"The design of the memorial, in the form of a group statue of the two men, has been entrusted to Mr. William McMillan, R.A., who is working in co-operation with the architect of London Airport to ensure that the memorial will be in harmony with its surroundings.

"We are confident it will be generally recognized that the proposed memorial is worthy of enthusiastic and generous support. Donations should be sent to the Secretary-General, The Royal Aero Club, 119 Piccadilly, London, W.1. Cheques should be crossed 'Alcock/Brown Memorial Fund.'"



FARNBOROUGH REPORT

With air brakes extended, the twin-Sapphire Gloster Javelin pulls round in one of its short-radius turns.

The Greatest Flying Show on Earth Gets Under Way

"FLIGHT" PHOTOGRAPHS

HOPES and fears for Farnborough always centre on two imponderables: the new aircraft—whether or not they can be readied—and, even less predictable, the weather.

Having watched the machines hiving in throughout Saturday and Sunday, we were gratified when we took our census on Sunday evening and found almost every one in its place, with the notable exception, of course, of the unlucky Boulton Paul P.120. And even the wide regret aroused by the accident to this stubby little delta had been largely assuaged by Ben Gunn's dramatic escape and by the Sunday-morning announcement of a 36-minute maiden flight by the mighty and beauteous Avro 698.

Monday, as the diligent reader will know, is considered to be a "technicians" day, and that learned fraternity was greeted with weather which, in our photographer's estimation at least, was near-perfect: that is to say, there was a blue sky dappled with a sufficiency of cloud to form a backcloth for his subjects and with a playful breeze—it was playing across the runway—to soothe the fevered brow.

For those unfortunate enough never to have entered the revered precincts of Farnborough on one of these great occasions we must remark that the scene, especially as presented this year, is fully worthy of a Frith to record its variety of spectacle—the vast marquee housing the static display, with its satellite tents strategically pitched; the colony of caravans, wherein earnest talk and good cheer keep pleasant company; and, of course, the incomparable array of aircraft, ranging in size from the Skeeters to the Britannia and Universal, in colour from chaste silver-grey to virulent yellow-and-red, and in form from the prim straight-winged trainers to exotic deltas and the big twin-rotor Bristol 173.

As on previous occasions there is a static park of aircraft, and this is supplemented for a period each day by the machines participating in the flying display—with the much-deplored exceptions this year of the D.H.110, Javelin and Valiant. To house this last-named trinity, what appears to be a sturdy stockade has been prepared on the far side of

Another tight-turner—the Canberra T.4 trainer (two Avons)—seen immediately after taking off for its amazing low-speed show.

A passing impression of the Supermarine 508 carrier-borne intercepter (two Avons) which demonstrated an astonishing rate of climb.

the airfield, wherein none may enter except through a security screen of the finest mesh.

Disappointment occasioned by an announcement that supersonic flying would not take place, in deference to local residents, heightened to chagrin when uninvited Sabres made several fast and smoky runs across the airfield. There was good news on Tuesday morning, however, when it was learned that the M.o.S. had lifted the ban. Farnborough Urban Council, it seems, had urged that the aircraft should be allowed "to go all out before the world audience."

The flying display on Monday was carried through with that precision and swing for which the organizers and controllers have won international acclaim. First came the four circuses (or groups, as they are circumspectly designated) composed as follows:—Group 1: S.A.4, Wyvern, Shackleton, Marathon Trainer, Prince and Heron; Group 2: S.51, Skeeter 3B, Type 171 and Type 173 helicopters; Group 3: Provost, Aiglet Trainer, Pioneer; and Group 4: Sea Hawk, Meteor 7, Sapphire-Canberra, and Viscount. Following these corporate demonstrations came the individual stars.

On Tuesday the Duke of Edinburgh flew in a Viking of the Queen's Flight to Blackbushe, whence he travelled by car to the Show, where he was received by Mr. E. C. Bowyer and Mr. H. E. Burroughes, the Director and the President of the S.B.A.C. He was escorted round the Static Exhibition by Sir William Farren (technical director A. V. Roe) and Mr. W. H. Goodinge (S.B.A.C. technical and exhibitions secretary). Afterwards he inspected the interiors of the Britannia and the Sprite-Comet, and went on to view the Valiant, D.H.110, Javelin and other aircraft before watching the flying display.

Viscount Alexander, Minister of Defence, was due to visit the Show on Wednesday, flying there by helicopter.

It seems fitting to accord all the aircraft individual consideration, irrespective of status. Unless otherwise specified, demonstrations described are those witnessed on Monday.

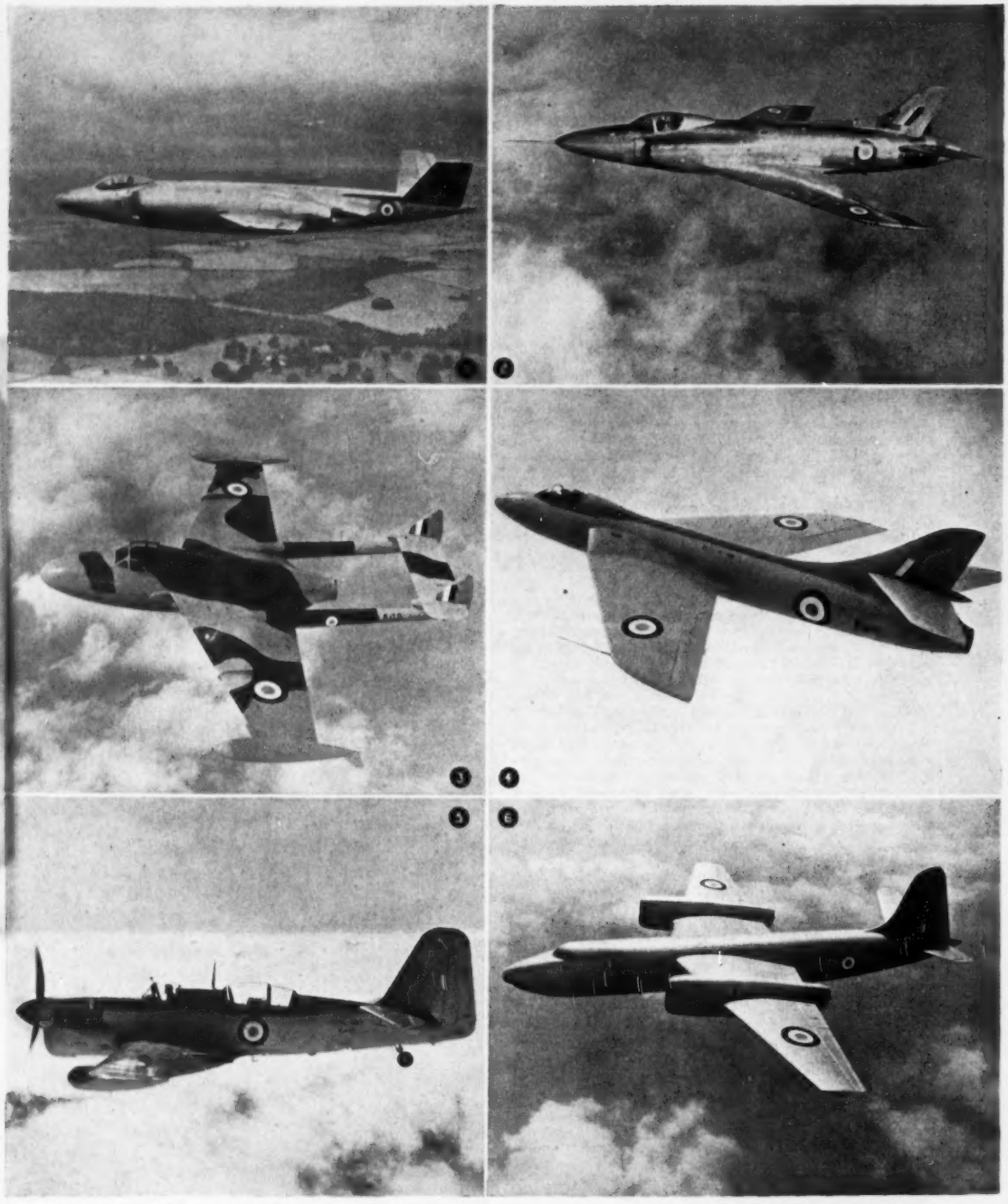
THE AIRCRAFT

Armstrong Siddeley Sapphire-Canberra.—A pair of Sapphires in such a setting as a Canberra—actually WD933, as previously seen—could not fail to dazzle, and dazzle they did as R. B. Prickett matched the climb of the Meteor 7 which had preceded him in his demonstration group.

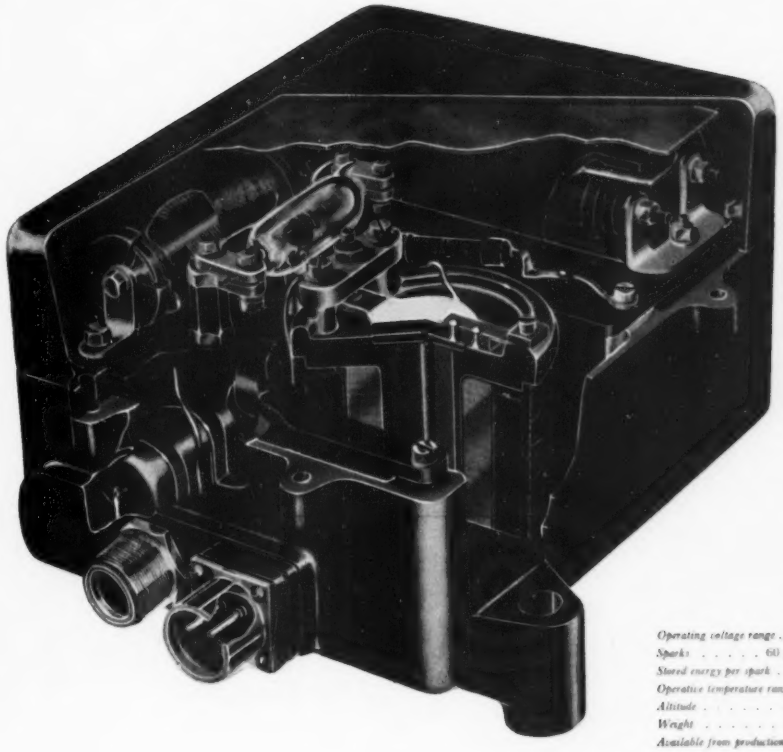
*Meteor N.F.*11.—"Use destructor here" invites an inscription on WM166, a standard A.W.-produced Meteor N.F.11, selected to represent its type this year. But a crew would have to find themselves in a tough spot indeed before making an end to one of these sleek two-seaters. It appears that last year's specimen, with its auxiliary tanks mounted on redesigned wing tips, was purely experimental; and, though the tanks gave excellent results, it has been considered politic to retain the common under-wing variety. Easily overlooked are the suppressed strip aerials in the

The tiny Saunders-Roe Skeeter 3b, powered with a Blackburn Cirrus Bombardier, gives an altogether exhilarating performance.

Uppermost are take-off studies of two big Vickers-Armstrongs types—top, the Viscount 701 (four Darts) and below it, the Valiant (four Avons). The helicopter is the very impressive Bristol 173 (two Leonides).



EN ROUTE TO FARNBOROUGH: From a Ministry of Supply Lincoln, "Flight's" photographer was able to secure these first-rate impressions of (1) Vickers-Supermarine 508 naval intercepter (two Rolls-Royce Avons); (2) Supermarine Swift super-priority intercepter (Rolls-Royce Avon); (3) de Havilland Venom N.F.2 night fighter (D.H. Ghost); (4) Hawker Hunter super-priority intercepter (Rolls-Royce Avon); (5) Fairey Firefly A.S.7 anti-submarine aircraft (Rolls-Royce Griffon); (6) Short S.A./4 bomber (four Rolls-Royce Avons).



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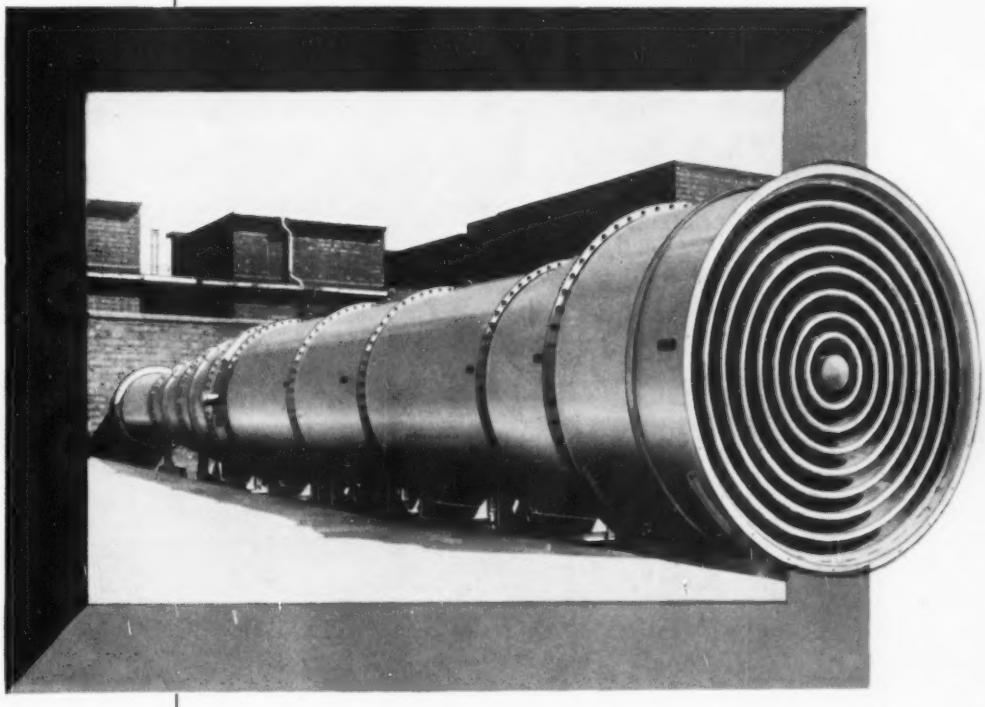

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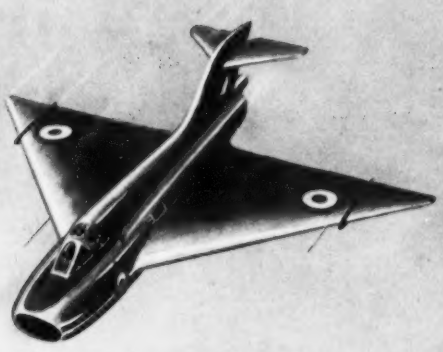

BOULTON PAUL Delta-wing research aircraft are preparing the way for the high-speed types of the future. It is true that the Delta plan form is not the only possible solution to the high speed problem. Correct choice in such matters can only be made when sufficient experimental evidence is available, and it is to provide this evidence that the Boulton Paul Deltas have been built. Their design is based on the wealth of aerodynamic and engineering experience accumulated over many years of experimental development, backed by unique facilities for research in these fields.

BOULTON PAUL AIRCRAFT LTD.

WOLVERHAMPTON, ENGLAND.

FARNBOROUGH REPORT . . .

nacelles. J. O. Lancaster did vertical upward rolls, inverted fly-overs and very tight turns with stirring effect.

Auster Aiglet Trainer.—Once again Ranald Porteus showed that a 130 h.p. Gipsy Major, properly handled, will sustain an acrobatic performance as spectacular as a demonstration with the latest, most powerful turbojet. The peak of his display in the Aiglet Trainer was a completely new manœuvre—a loop punctuated at its summit by a complete flick roll from the inverted.

Auster Ambulance/Freighter.—Two stretchers, one above the other, and a seat for a medical attendant are mounted in the compact Ambulance/Freighter (static display). The prototype, powered by a 180 h.p. Cirrus Bombardier, is shown.

Auster Cirrus Autocar.—Bright yellow, and bearing a Union Jack on the rudder, the Cirrus Autocar is unlikely to be missed in the static park. The single-seat model shown, G-AMPA, is equipped to the requirements of Pest Control, Ltd., as a crop-sprayer; insecticide is dispensed from a large internal tank by a 34-nozzle spray-bar.

Blackburn and General Aircraft G.A.L.60 (Universal).—Though it is not presented in flight this year, the Yorkshire mammoth again commands an elephantine share of attention—and not by its bulk alone, but by the news, released over the week-end, that it is to be ordered for R.A.F. re-equipment. As seen at Farnborough, the prototype is equipped for the military supply-dropping role. Within its barn-like hold are a 25-pounder gun and an infantry carrier, lashed on pallets. In the great Static Show marquee is a full scale mock-up of the freight compartment floor and a working scale model of the car ferry version of the Centaurus-powered Mk 2. Blackburns are naming the Napier Nomad and the Wright Turbo-Cyclone as alternative power units.

Bristol Britannia.—The low-pitched, unusually pleasing sound which accompanied the Britannia's first public take-off gave no hint that the four Proteus 2 turboprops of the new Bristol airliner were, in fact, delivering something like 12,000 e.s.h.p. Intimate circuits of the airfield, performed in a manner which left no doubt as to "Bill" Pegg's confidence in his new charge, confirmed the impression that here is the quietest large airliner in the world. Blue, white and gold B.O.A.C. markings enhanced the innate beauty of the design; economically, the Britannia is known to be a very attractive proposition, and its Farnborough debut was in keeping with the reputation already gained by this thoroughbred inter-continental transport.

Bristol Olympus Canberra.—Though restricted in level speed by Mach limitations, this test-bed *de luxe* ascends to Olympian heights with untrammelled ease and marvellous speed. Walter Gibb, who reached double-figure flying time within a week of the maiden flight on August 5th, concentrated on showing off the quite exceptional powers of acceleration, allowing the Canberra to roll for a few yards then, apparently, slamming open the power levers and ascending heavenward to the accompaniment of muffled twin-spool thunder. Static examination gave the impression that the jet-pipes are on the small side, considering the thrust available (due, probably, to structural constriction) and it is doubtful whether, in this particular experimental installation, the great Bristol turbojets are able to give of their very best.

Bristol Type 170.—No Farnborough would seem complete without this perennial stalwart. The specimen displayed—NZ5906—is a particularly handsome one, highly-polished, and proudly emblazoned in blue and gold with the legend "41 Transport Squadron Royal New Zealand Air Force." High-backed, rearward-facing seats and a clutch of stretchers occupy the interior, and the nose has transparent panelling.

Bristol 171.—Although P. R. D. Wilson's performance on the demonstration-model 171 was designed as a foil to that of its larger stablemate, the 173, it served as a reminder of the speed and lively characteristics possessed by this 5-seat helicopter.

Bristol 173.—C. T. D. Hosegood's demonstration of the twin-Leonides 173 helicopter evoked favourable opinions, particularly as regards stability and manœuvrability. This 173 is the prototype of a 13-seat transport to be used by B.E.A. and now attractively painted in Bristol's blue and white livery. Surprisingly, Hosegood taxied out to the runway before making a slightly nose-down take-off. A notably fast fly-past followed, the unusual machine looking very well in the air. Before touch-down, its hovering qualities were shown by a protracted period of steady, motionless flight in front of the enclosures.

D.H. 110.—Probably the most disappointed pilot on Monday was John Derry, whose intention it was to bang aside the sonic barrier with this twin-Avon multi-purpose fighter, the bat-like form of which is rendered the more sinister by its glinting black finish. The crackling up-rated Avons thrust the 110 from the runway after a very modest run, and it was absent for a few minutes while the Sprite-assisted Comet showed its paces. Then it came rocketing back up the runway at a confirmed 700 m.p.h., went streaking by with percussive effect, and, in seconds, was scaling celestial heights like some bizarre winged missile, and fast

H.R.H. Prince Philip, Duke of Edinburgh, is greeted on arrival (having flown to Blackbushe from Balmoral) by Mr. Hugh Burroughes, president of the S.B.A.C. (centre), and Sir William Farren.

shrinking from sight. Returning, Derry flicked it round in rolls which, for rapidity and smoothness, would not have shamed a modern single-seater, and continued to hold attention with a low-speed fly-over and a tightly pulled loop under a loitering cloud. Then for good luck he threw in a final low roll as he circuited to land. An electrifying, decibelligerent performance this, by one of the world's most astonishing military aircraft. (On Tuesday Derry went supersonic, though without the tell-tale bangs being heard on the airfield. He came past the enclosures at Mach 0.95, and reached 17,000ft at the top of a huge "S," with a roll in the middle.)

D.H. Reheat Venom.—This Venom F.B.1—VV612—adapted for two-position D.H. afterburning, is silver-finished and carries red stripes on its wings outboard of the booms. Whereas on the reheat Venom last year the necessary modification appeared somewhat elementary, if not crude, the afterburner has now been faired into the nacelle with notable smoothness. The power-boosting installation, incidentally, is primarily intended for the two-seater Venoms and Sea Venoms. R. Plenderleith was the demonstration pilot, and the most effective of his manœuvres was his run-in with dive brakes extended, followed by retraction of the brakes and immediate opening up to full boosted power, with the afterburner glowing and the tail-pipe emitting the characteristic blood-curdling cacophony.

*D.H. Venom F.B.*1.—For the first time, de Havillands officially claim that this fighter/bomber is "now in service with the R.A.F." The example shown (WE281) is finished in the new R.A.F. camouflage scheme for aircraft of its class—blue under-surfaces and grey and olive green camouflage on sides and top. Under the wing are "stalks" for 1,000 lb bombs.

*D.H. Venom N.F.*2.—Notwithstanding the excrescences which have sprouted since the type first appeared (of which small fixed leading-edge slats, inboard of the tip tanks, and fore and aft "ledges" on the tanks themselves are the latest), the Venom night fighter retains its clean-cut look. The specimen shown is a standard R.A.F. production machine—WL808—finished in grey and green. A camera gun is housed in a fairing, stalk-attached to the port wing, just outboard of the air intake.

*D.H. Sea Venom N.F.*20.—With primly folded tip-tanked wings stands Sea Venom WK385, looking worthy of a Wootton painting in its grey and light-blue Naval uniform. Like the shore-based Venom N.F.2, ranged nearby, it has small fixed slats forward of the leading edge, inboard of each wing-tip tank. Inscriptions give fuelling instructions, mentioning fuselage tanks, No. 1 tank and No. 4 tank, and, as on several other aircraft present this year, the prescribed fuel is designated as "Avtur 100."

*D.H. Vampire T.*11 *Trainer*.—It is announced that later production models of the Vampire T.11 will be equipped with ejector seats, but the specimen shown at Farnborough—WZ429—is without these escape-aids.

*D.H. Chipmunk T.*10.—Neat and dainty in the static park is a Chipmunk T.10, serial numbered WP838, and of standard R.A.F. production type.

D.H. Comet 1*A*.—Destined for early delivery to Canadian Pacific Airways, the 36-seat Comet on static display is registered CF-CUM and bears the plain but effective scarlet, black and white markings of the Canadian company. It is the 13th Comet to be built, and differs from earlier Mk 1s in having extra tankage and provision for water/methanol injection. The indoor display contains a superb Shawcraft model of a 44-seat Comet II, complete in detail even to the miniature copy of *Flight* in the library aft.

An achievement no other country can match—the Saunders-Roe Princess.

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D.H. Sprite-Comet.—John Cunningham's take-off in G-ALVG—the first prototype Comet—was assisted by the 10,000 lb extra thrust of two Sprite rockets between the Ghost tail-pipes. Actuated during the take-off run, the Sprites left no apparent smoke and made surprisingly little extra noise; there was certainly nothing to which passengers might have objected. Climb-away was steep after a notably contracted run, and adoption of the term "Spritely" seems only a matter of time. The lack of smoke presumably indicated the use of a catalyst other than the permanganate originally specified.

D.H. Heron.—Wearing for the display the rising sun and insignia of Japan Air Lines, the Heron in the flying programme is de Havilland's 14-seat demonstration aircraft G-ALZL. Heron production is going well, and the first aircraft to carry the scarlet-and-white colours of J.A.L. (who have ordered three) may be delivered in April. Features of D. B. Taylor's demonstration were a steep climb and very short landing.

D.H. Dove.—The quite remarkable success of the D.H. campaign to sell Doves in America (well over 50 have been bought for dollars) is epitomized by the luxurious six-seater executive model shown in the static park. Though temporarily registered G-AJLW, it wears the Stars and Stripes on the fin and the insignia of a Cleveland, Ohio, construction company on the blue-and-silver fuselage.

English Electric Canberra T.4.—Roland Beamont having been absent last year in America, it was felt that he could be counted on for a spectacular return to the Farnborough fold; and it is not Bea's habit to disappoint. He had said that his show would be "slow and quiet," with no fast flying, and it turned out to be a masterpiece. The instant the Canberra was airborne he whirled it round off the runway as though it were a frolicsome Tiger Moth, and coaxed this middleweight bomber-trainer through a sequence of wondrously tight turns, aided by deft application of tailplane trim. His rolls-off and bank-to-bank changeovers—always perfectly placed—were the acme of piloting skill. The Canberra itself looked refreshingly new in its silver finish with collegiate bands of yellow.

English Electric Canberra B.5.—With its gold-lettered inscription "The Record-Breaking Canberra," this machine is, perhaps, the most distinguished-looking of the several Canberras on view. Serial-numbered VX185, it is, of course, W/C Beamont's transatlantic "double-crosser." As most readers will know, the historic flights were made without recourse to tip tanks, which suggests that the internal tankage of the B.5 target-indicator is greater than that of the B.2 tactical bomber. The bomb-aimer/observer's optically flat panel affords a wide field of vision.

Fairey Gannet A.S.1.—The third prototype—WE488—is displayed with all the latest modifications: three cockpit enclosures, two auxiliary fins (an increase in main-fin height was prohibited by ship hangar dimensions) and radar repositioned nearer the tail. This last alteration was made in consequence of an elongated bomb bay, which, the makers aver, "carries armament that is still on the secret list." Overseas visitors were duly impressed by the fact that the Double Mamba will run on ordinary ship's fuel. In this machine Peter Twiss unstuck from the runway with startling alacrity and gave his usual half-power full-power performance with even more than his usual verve, opening up and shutting down the units of the Double Mamba with the greatest of ease.

Fairey Firefly A.S.7.—Although internal details are supposedly secret, several interesting titbits of information are to be gleaned in a walk round this specimen—WJ149—of our interim carrier-based anti-submarine aircraft. Thus, for the Rolls-Royce Griffon (which has ten fishtail flame-damping exhaust stubs for each cylinder bank) 100-octane, 130 or 150 grade fuel is prescribed, and 86 gallons are carried in an inter-cockpit tank. There is a tank for 3½ gallons of water methanol, and the wing-mounted radome is matched by a 55-gallon fuel tank in the opposite wing. Beneath the two-seater rear-cockpit canopy, the side-by-side radar scopes, an altimeter and an A.S.I. are discernible.

Gloster Javelin.—The performance of this delta-wing multi-purpose fighter is being watched especially closely, for it is the only fighter of its kind selected for R.A.F. re-equipment and the only one of its wing form in this country. Moreover, it has been much in the news as "the only aircraft capable of overcoming the vision barrier" (thereby, it is suggested, being the first to fly faster than light!) and has been positively claimed as being "fully capable of flying faster than sound." Up to the present the Javelin has not achieved supersonic flight—indeed, it is flying at Farnborough under a temporary speed restriction; but Bill Waterton's demonstrations prove that it has quite remarkable take-off, landing and slow-flying characteristics—factors of weighty importance in a night fighter; furthermore, its development potential appears extraordinary. To this potential the whole country will be looking for reassurance in the years ahead. For the present it can be said without reserve that Waterton's demonstrations are a remarkable exposition of certain of the Javelin's powers—notably a tight turning-radius, excellent handling at take-off, landing and in low-speed flight, a normal approach angle, rapid acceleration, and agility in the rolling plane.

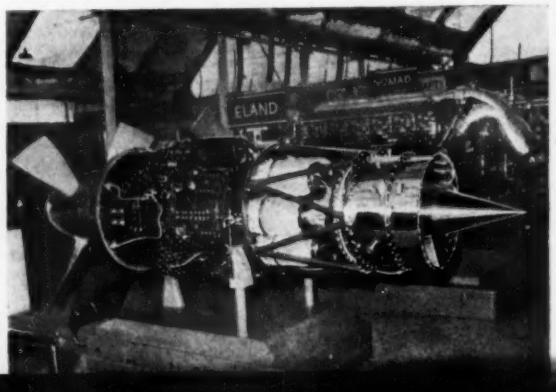
Gloster Meteor T.7.—Large-diameter air intakes—for some time standard on production Meteor 8 fighters—characterize this trainer (WL453). During Mike Kilburn's memorable, if short, demonstration, it spent most of its time inverted. The rate of climb, either way up, and short landing were equally remarkable.

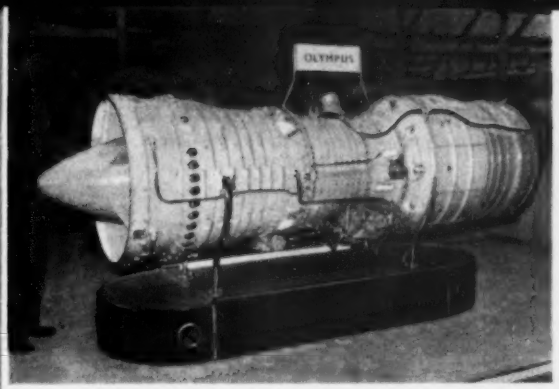
Handley Page (Reading) Marathon Trainer.—Fully equipped, with provision for three pupil navigators and one wireless operator, this machine—XA250—is making an excellent impression both on the ground and in the air. The R.A.F. will use 30 similar machines on long advanced-training flights—including the U.K. Mediterranean trip. W. R. Burton manoeuvred and landed XA250 with the port outer Gipsy Queen shut down.

Hawker Hunter F.1.—Neville Duke set off in the Hunter on Tuesday to take advantage of the lifting of the supersonic ban and, for reasons unexplained at the time of writing, was not seen at Farnborough again, though his contrail was spotted soon after take-off at perhaps 40,000ft. But on the Monday he had given his customary astounding show—which is to say that it was supreme in conveying an impression of sheer speed. Quick as thought, the Hunter grew from a faraway speck to a careering projectile, flashed by in its cyclonic passage and all but disappeared again in the blue. One sensed, rather than saw, its passing, and was left utterly thunderstruck. Subsequent slow and rapid rolls were eloquent testimony to the quality of the powered controls. Duke's mount this year is the second prototype—WB195—and it displays for the first time ports and ejection chutes for four guns. A small bullet fairing at the rear intersection of the horizontal and vertical tail surfaces may account in part for the proven supersonic ability of this super-priority intercepter.

Hawker Sea Hawk.—This ship-shape naval fighter (WF147) is typical of the Sea Hawks now entering naval service. One suspected, from A. W. Bedford's dashing demonstration, that

Many good qualities are evident in the Napier Eland 3,000 h.p. turboprop. Particularly meritorious are this new unit's fuel economy, power/weight ratio, and small dimensions.





By comparison with other engines, Bristol's Olympus looks surprisingly small for its power. The display unit is finished in grey.

the narrower cockpit enclosure, and perhaps other mods., may have helped in raising the speed by an appreciable margin of knots.

Percival Prince IIIB.—As befits a telecommunications research aircraft, the silver Prince IIIB flown, in the first group, by J. F. Arnold made a straightforward fly-past to show off the extended nose (which has provision for cloud-and-collision radar) and capacious fuselage, housing an imposing batch of navigation and approach aids. Registered G-AMKY, the aircraft is the first of three ordered by M.C.A., whose flag is worn on the fin.

Percival V.I.P. Prince.—A dapper cream-and-green finish identifies the "static" Prince—a standard Series III model luxuriously fitted out for six important passengers. In common with other variants, it has two 550 h.p. Alvis Leonides.

Percival Sea Prince T.1.—Statically exhibited, WM735 is the representative of a sizeable batch of these roomy and adaptable flying classrooms now being delivered to the Royal Navy.

Percival Provost T.1.—On Monday R. G. Wheldon introduced his performance on this clean-cut trainer with a 12-turn spin, and, levelling out directly in line with the runway, proceeded round the sky to perform most of the manoeuvres in the book. Percivals are showing a model of a Provost basic-trainer development with a turbojet—possibly an Adder—mounted amidships, with twin intakes. The undercarriage retracts.

The A. V. Roe Deltas.—As the world now knows, the first delta bomber—the incomparable Avro 698—first took the air at Woodford on August 30th. Two days later it was flown to Boscombe Down and in setting out for Farnborough the same day is understood to have developed slight trouble, which was traced to an undercarriage micro-switch. So on Monday Avros' two Jimmies—Orrell in the 707B and Nelson in the 707A—kept the delta flag (or rather pennant) flying with their synchronized performances in these little research machines.

But Tuesday was the day of days—the day which will always be remembered for one of the most significant flying demonstrations in the whole history of British aeronautics. The reader may care to imagine this late-summer afternoon, with woolly clouds strewing the sky and, beyond Laffan's Plain, three triangular silhouettes orbiting low on the horizon. Joining formation, they headed for the airfield—in the lead a white triton, with a red minnow on the left and a blue one on the right. Low and fast they came sweeping in—the 698 at last, in all its white beauty, with the red 707A and blue 707B. Then one remembered a certain evening in 1949 when S. E. Esler brought our very first delta—the original Avro 707—over the same airfield on a similar occasion.

The tri-coloured formation broke. The bomber wheeled like some great vacht and came scudding across at a speed which, despite its size (the span must be 100ft or so), was utterly amazing in view of the fact that this was but its fourth flight. Indeed, the 707s, when they sought to tag along, appeared to find themselves hard-pressed. Then R. J. Falk (for he was, of course, the pilot of the 698 and was, incidentally, flying alone) really got into his stride and, except for aerobatics, flew the brand-new bomber exactly as he is accustomed to fly one of his little stable of "hack" 707s. That is quite literally the truth, and it is a truth in which everyone in this country (and, extra-specially, a few people Manchester-way) may take comfort and pride. A special *Flight* photograph of the 698, taken at Farnborough, appears on p. 329.

Avro Shackleton M.R.2.—Now one of the elders of the Display, the Shackleton still cuts a dash—especially in its Mk 2 form as represented this year by WG531. It appears most aggressive in frontal aspect, with the nose crowned by a sighting emplacement for the twin 20 mm guns, and with the triangular bomb-aiming panel below. The tail look-out post has cushions upon which its occupant reclines, and zipp-fastened curtains. Johnny Baker's steep climbs from take-off, and even steeper zooms after fast runs (with the triple-extension radome fully down) were his most impressive to date.

Rolls-Royce Reheat Avon-Canberra.—That the Hunter, Swift, Javelin and D.H. 110 have provision for afterburning is now common knowledge, and equally well known is the importance of this power-boost system in fighter development generally. To demonstrate the potentialities and *modus operandi* of the Avon afterburners, the pilot of this Canberra test-bed (J. H. Heyworth, A. J. Heyworth and H. N. D. Bailey are sharing the job) first has it towed out on to the runway. Then, at a signal from control, the starter cartridges are fired, the high-rated Avons are opened up and the afterburners cut in. The Canberra is on its way in 20 sec. A unique and wholly convincing demonstration.

Saunders-Roe Princess.—On Tuesday, keen eyes spied the huge form of the Princess standing-off in the distance some time before she made her majestic public debut with a low run, at 280-300 m.p.h., over the airfield. The sound of her ten Proteus turboprops, and particularly the coupled units, was strongly reminiscent of that of the Brabazon. Geoffrey Tyson made several circuits over the airfield, turning effortlessly and remarkably steeply, so that the sun dappled the double-bubble hull. At the time of her appearance over Farnborough this superb flying boat, the hull of which is the largest metal structure ever made for an aircraft, had completed seven hours' flying.

Saunders-Roe Skeeter.—This small two-seater helicopter offered the crowd an unexpectedly lively performance, including some tight, low-down "S" turns. Its manoeuvrability and precise control response were particularly notable. The engine is the Cirrus Bombardier and the first order will probably come from the Navy for a trainer version. An attractive civil Skeeter—costing around £10,000, it is rumoured—is a static exhibit. John Jeffery and Ken Reed share the demonstrations.

Scottish Aviation Pioneer II.—With its wide span and wondrous arrangement of slots and flaps, the Leonides-powered Pioneer II resembled a great silver bird as it progressed down the runway in a series of hops. N. J. Capper used the brakes to shorten the landing-run to perhaps 50 yd, and his take-offs were equally startling. The prototype demonstrated takes five passengers, but the Mk III, shown in model form, would seat nine. The maker's main preoccupation, however, is the promising Twin Pioneer, which is expected to fly in 18 months' time.

Short S.A.4.—The second prototype—VX158—is shown and is seen to differ from the first machine, introduced last year, in its cleaner nose lines. The finish is a becoming silver grey, and there is a parachute in the tail-cone. Excellent handling characteristics are claimed—a claim which was certainly substantiated by W. J. Runciman's flying demonstration. Especially remarkable was the speed at which he brought the big bomber along the enclosures—substantially faster than last year's runs by the restricted first prototype.

Short Sealand.—The much-travelled demonstration Sealand, G-AIVX, made its appearance in the static park. Though capable of carrying eight passengers, the hull of this particular example contains but two seats and a bed.

Vickers Valiant B.1.—The magnificence of this second prototype Valiant (characterized by lipped, instead of letter-box, intakes for the four Avons) was shown off by E. B. Trubshaw in climbing turns and flashing, all-out, straight and level passes. The general impression was that this machine—WB215—was flown considerably faster and handled less preciously than its pre-

Portly but nimble—the Fairey Gannet submarine-hunter/killer.

Handsome, easy-flying and astonishingly quiet—the Bristol Britannia

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decessor. Jet transports being in everybody's mind, Major Oliver Stewart aptly recalled, in his commentary, Sir Ronald Weeks' reference to other important aircraft deriving from the Valiant. A 600 m.p.h. cruising speed and 120-130 passengers were mentioned.

Vickers Varsity.—Representing this crew trainer, now well established in R.A.F. service, is WF429.

Vickers-Armstrongs Viscount 701.—E. B. Trubshaw's handling of G-ALWE, *Discovery*, the first of B.E.A.'s 26 forty-seat Viscount 701s, appealed to pilots and laymen alike. Potential passengers appreciated the subdued tone of the four Dart turboprops as their combined output of some 6,000 equivalent h.p. lifted the glittering airliner quickly off the runway. After a smooth circuit, the Viscount flew steadily past the enclosures and away from the airfield with Nos. 1, 2 and 3 airscrews feathered; height was retained throughout this lengthy passage on quarter-power—a most impressive performance.

Vickers-Supermarine Swift.—David Morgan's masterly exposition of the late prototype Swift (WJ965) showed beyond doubt that this fighter is "right." This year its speed past the enclosures approximated to that of the Hunter and the rate of roll was astonishing. Morgan did four turns of an upward roll at high speed until cloud obscured the aircraft; he also showed that the large-chord flaps can be used as air brakes and—significantly—they can be applied at nearly full speed. Examination reveals a large gun port under each intake and a notice indicates the presence of a 96-gal tank between the air ducts.

Vickers-Supermarine 508.—After a short unstick run, M. J. Lithgow held down this thick-set, "double-barrelled," ship-borne intercepter for several seconds, then pointed it vertically skywards. It ascended for all the world like a winged V.2. With the leading-edge droop-snoot flaps and trailing-edge flaps extended, Lithgow subsequently made what was believed to have been the slowest run in this machine to date. The most noticeable modification is the addition of a "spine" running forward from each fuselage/tailplane intersection.

Vickers-Supermarine Attacker F.B.2.—This version is the latest production-type Attacker fighter/bomber and the chosen example—WK338—is shown with five take-off rockets—four above and one below each wing—and, beneath the wings, 16 rocket projectiles. Shown as alternatives to the R.P.s are two (nominally) 1,000 lb bombs, each marked 946 lb.

Westland Wyvern.—Though handicapped by a torpedo and twelve rockets, R. S. Bradley's mount nevertheless impressed by its speed and manoeuvrability. With the mighty Python turboprop whining like a siren, Bradley put the Wyvern into a steep climb after his low-altitude pass, and, on Tuesday, carried out two upward rolls. The power-folding wings were demonstrated before and after flying.

Westland-Sikorsky S-51 Dragonfly.—Opening performer in the helicopter group's flying display was the H.R.3 version of the familiar Dragonfly. On steadiness and reliability rather than spectacular manoeuvres lay the emphasis in its flying demonstration, and the logic of the choice of this familiar and proven machine for so many different duties was clearly shown.

THE STATIC SHOW

Power Plants.—More than 20 specially prepared exhibition engines are on view. The more familiar units are mainly shown sectioned—and most attractive and instructive they become. The majority are semi-standard engines given a display finish. Security has its effect upon some displays: the Olympus, in fact, even has a disc of translucent plastic at each end to obscure any view of the interior.

Napier's Eland is the most recently released engine, and it appears to be an eminently "installable" turboprop, being exceptionally neat, light, small and efficient. Its power of 3,000 e.s.h.p. is gained by selection of fairly high r.p.m. and, in spite of its "single-shaft" layout, it has a cruising fuel consumption at 35,000ft of no more than 0.49 lb/hr/e.s.h.p. The Eland began life as a Napier private venture, but is now the subject of a M.o.S. development contract. On September 2nd it passed its preliminary acceptance test, which implies an output of 50 per cent full power and 92 per cent maximum r.p.m. for a period of one hour. Also on Napier's stand is the massive Nomad which, the company states, still has the best specific fuel consumption of any engine of any kind anywhere.

The Armstrong Siddeley range is most impressive. All their display engines—there are four of them—are beautifully finished in olive green, cream and chromium plate. Only the Viper is new to Farnborough, and incredibly small it is. The Sapphire, in spite of its commendably small diameter, appears enormous by comparison; this year's exhibit is a new Sapphire equivalent to the 8,300-lb thrust unit.

Rolls-Royce are showing an early Avon, a Derwent, and a sectioned Dart. The finish of these exhibits is in black, chromium plate and "crackle" cream.

On the de Havilland stand are representative engines from the well-known piston and turbojet range which have proved so universally popular. The civil Ghost, Sprite, and four- and six-cylinder Gipsys are all shown in D.H. blue and cream livery.

Alvis are exhibiting two Leonides—a helicopter engine and a sectional "fixed wing" unit—but the company's new design, the Leonides Major, is, unfortunately, absent.

Returning to the Bristol stand, the visitor sees both the Centaurus and Proteus 2 as beautifully sectioned engines with airscrew hubs, cropped blades and cowlings of the most transparent Perspex. The impressive Olympus is, as we have said, blanked-off at each end; the interior is illuminated and, by means of an electric drive, an illusion of moving blading is seen through the air intake.

Rockets and Missiles.—On the Ministry of Supply stand is an example of the R.A.E./Fairey-developed Beta II unit of 2,500 lb thrust which has been developed primarily for powering missiles and targets; two smaller rockets are, apparently, mounted in a Fairey delta research model on view in the aircraft park.

Bristols have been allowed to show an early version of a ramjet test vehicle which has been developed for examining the behaviour of ramjets in supersonic free flight. It has no wings and is launched from a ramp, boosted by two 7½in diameter cordite rockets which slip off to the rear at the end of the boost phase. A supersonic experimental missile is shown on the M.o.S. stand, and the Ministry is displaying a considerable amount of missile test equipment.

Accessories.—The exhibits on the stands of S.B.A.C. associate members are dominated by the sheer bulk of three superb bogie undercarriage units. On the Dowty stand is seen an example of the eight-wheel scooter-type bogie as fitted to the Avro 698. British Messier are showing a Britannia bogie *sans* wheels, and Electro-Hydraulics have been allowed to exhibit an impressive eight-wheel bogie whose application cannot, at the moment, be divulged.

Boulton Paul are exhibiting a Xylonite model delta, in which internal structural members have been reproduced; this model is under vibration test, the wing deflection being analysed by the company's six-channel recorder. Four associated companies—Kelvin and Hughes, Smiths, K.L.G., and Waymouth—have combined to form one large stand on which new exhibits are too numerous to mention this week. Flight Refuelling, Ltd., are showing the Mk 12 airborne hose unit and the associated probe-and-drogue equipment.

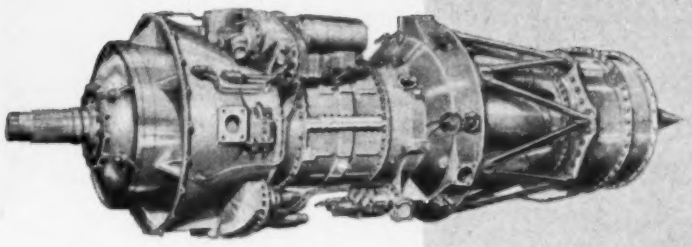
Pyrene are showing their new visual smoke-indicator, which is considered complementary to their established smoke detectors. New from Normalair is a range of demand oxygen equipment and extra-high-pressure cabin air equipment for new bombers. Western Manufacturing (Reading) are exhibiting their stall-warning stick-shaker and a two-speed trimming actuator. Ferranti can display quite remarkable progress in the design of radar components; the Britannia airscrew on the de Havilland stand is worthy of very close examination; Irvings are displaying a ribbon-type parachute; Goodyear have included a complete wheel, with disc brakes, from the Valiant; and Decca are showing interesting applications of the Flight Log for the use of pilot and passengers.

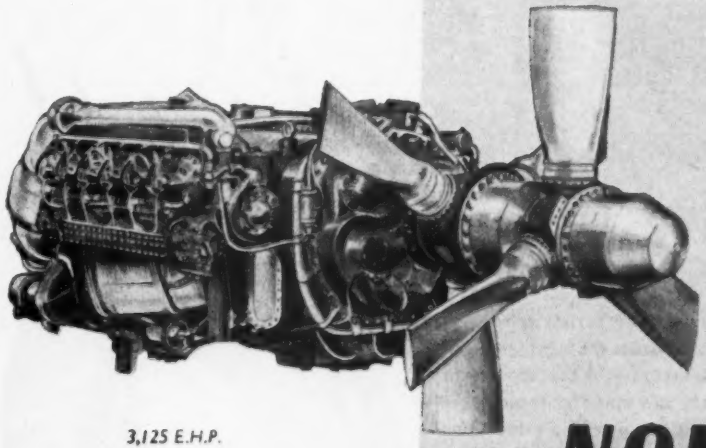
Finally, mention must be made of the target Type U-120D displayed by M.L. Aviation. This 12-ft span aircraft is powered by a Vincent two-cylinder four-stroke engine which gives about 70 h.p. at present. A description of both target and engine will appear in our review of the show next week.

Farnborough Footnote: The memorable first appearance of the Avro 698 delta bomber at the Display, on Tuesday, is the subject of a special full-page "Flight" photograph in this issue (p. 329).

ELAND

3,000 E.H.P





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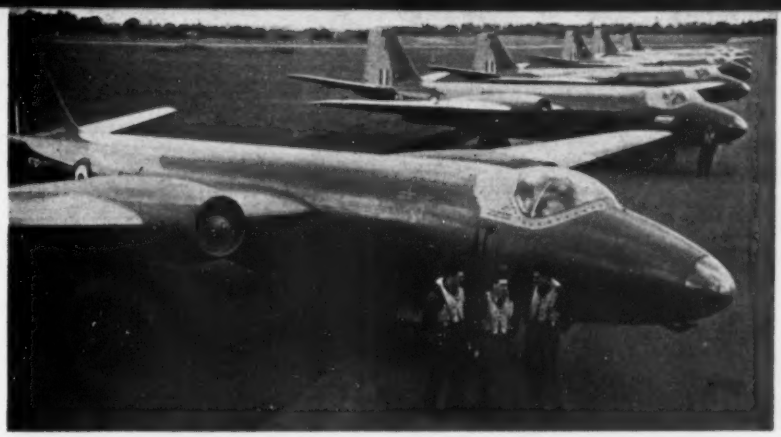
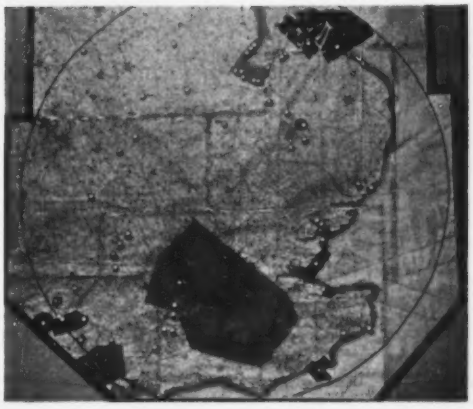


"FLIGHT" PHOTOGRAPHS

Six Canberra B.2s of 231 O.C.U. are seen on the left in the new high-altitude bomber livery. The enlarged serial numbers mentioned overleaf have not yet been applied. Their "local flying" area is shown below.

CREWS for the CANBERRAS

The Work of No. 231 O.C.U., Bassingbourn



FIVE miles north of Royston lies the airfield of Bassingbourn beside the Roman road known as Ermine Street. Opened in 1938 as a base for Blenheims, it has since housed Fortresses of the U.S. Eighth Air Force and units of R.A.F. Transport Command. Now this fine, permanent station has reverted to Bomber Command and is administered by No. 1 Group.

When we visited Bassingbourn recently we were privileged to see something of the work of No. 231 Operational Conversion Unit, which is one of the units based there. It is from details, rather than from generalities, that one begins to realize how different is this O.C.U. from any other at present in the Royal Air Force. For example, the crews at briefing are confronted with the familiar wall-blackboard, upon which may be chalked the details of a training mission with 25-lb bombs; and only when one comes to the "Altitude" column does a departure from World War II practice become apparent—for here one may find the figure "40,000ft". On the other side of the room is the familiar map showing the "local-flying" area—but inspection of it reveals that this area includes everything within a radius of 100 miles of Bassingbourn.

The ability to operate at extreme altitude and to cover great distances in a short time are but two of the outstanding characteristics of the Canberra, and it is only when the aircraft is seen in everyday service that the problems met in its introduction become evident. Until recently, Canberra crews were trained with operational squadrons, but production of the type is now sufficiently great to require the provision of special Canberra conversion units. No. 231 is the first such O.C.U. to be established, although a second will open in a few months' time.

The standard B.Mk 2 aircraft requires a crew of three; a pilot seated to port beneath the extensive transparent blister, and two navigators (one a radar-operator, and the other a plotter) side-by-side behind; all three have ejection seats. The Canberra thus makes but modest demands for aircrew, and the old trades of engineer, gunner and—in a sense—signaller and bomb-aimer, are no longer required.

Each course at Bassingbourn is made up from approximately equal numbers of regular and National Service Pilot Officers. The

Emergency drill practice is facilitated by six dummy fuselages (left) made by English Electric; the right-hand view shows student pilot officers at navigation and signal practice.

Familiar to all aircrew—even those who fly Canberras—are the tedious tasks of perfecting navigational plotting (left) and aircraft recognition (right).

CREWS FOR THE CANBERRAS . . .

student pilots come to the O.C.U. from all-weather advanced flying schools, or an air navigation school and a bombing school in the case of navigators; this involves a total service of some 14 months and a probable flying time of about 300 hours.

The first fortnight at Bassingbourn is devoted to ground training, for the prospective Canberra crew-member still has much technical knowledge to acquire, particularly in the fields of advanced navigation and bombing techniques, practical radar, and aviation medicine. Crews are formed at this stage, and each man's responsibilities and relations towards his two team-mates are placed on a proper footing.

In the third week, the pilots carry out dual refresher flying in Meteor T.7s (although this practice will, no doubt, shortly give way to instruction on the Canberra T.4). The pilot's introduction to the Canberra is then effected with the standard B.2, the pupil doing two passenger-trips seated beside an instructor who demonstrates the general behaviour of the aircraft. Navigators receive similar air-experience in the B.2 accompanied by staff-navigators.

When the pupil pilots have soloed, the remainder of their flying is carried out with their crews. It is divided equally between day and night flying—25 hours of each—and involves long-distance sorties at up to 40,000ft, day and night bombing being practised with 25-lb bombs. When weather permits, flying at Bassingbourn is in progress for 20 hours out of each 24.

There is no doubt that No. 231 O.C.U. is doing a remarkably fine job, and both the pupils and the staff are working extremely hard. But no hint of strain was apparent among them, or among the servicing crews. This point is worthy of mention for, although it should not be implied that the training of Canberra crews is a particularly strenuous task, the operation of this aircraft represents the ultimate stage to which pilots or navigators can be trained in the Royal Air Force at present. True, there are bigger—and possibly faster—aircraft in the Service, but the Canberra houses much equipment which the pupil will not previously have seen. The Canberra crew must also be capable of accurate bombing at high speeds and extreme altitudes; they must possess considerable technical knowledge in several fields; and their navigation must be rapid and precise—for the consequences of being lost, even for a few minutes, occur with rapidity and, perhaps, serious results.

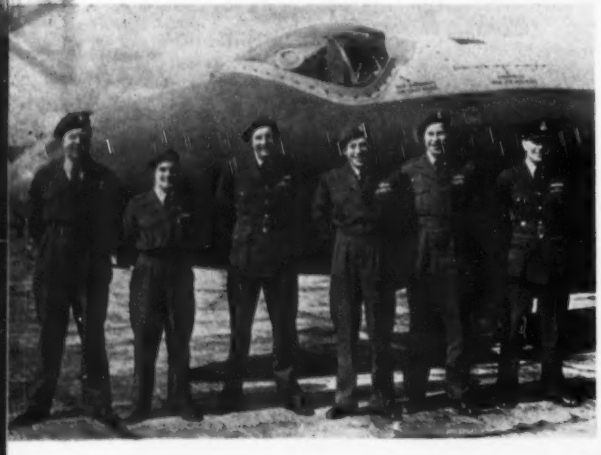
There remains the "psychological" side of Canberra flying. While this aspect may be overrated by the layman, it is still a notable fact that, in the space of a few months, a youth from school can be made to feel at home in the ejection seat of a Canberra, with the loneliness of the stratosphere beyond the canopy. A Canberra is also a great responsibility in terms of pounds, shillings and pence.

Among these sobering ruminations, the work of No. 231 O.C.U. appears as a broom to sweep away unfounded doubts, for efficient crews are being formed without apparent difficulty and, so far as can at present be judged, without abnormal "wastage" on the way. The only cause for regret is the short period—under three months—during which a National Serviceman can serve with a Canberra squadron. To counteract this, a form of "boost" training for trained crews on reserve status will commence next year; this will probably consist of a fortnight's intensive Canberra flying.

Finally a word about the aircraft. They are well liked by staff and pupils and, thanks to their low build and accessibility, by the ground crews also. The Canberras at Bassingbourn are finished in Bomber Command's "high-altitude" livery of grey and green camouflage on top, with sides and lower surfaces in cerulean blue. Recognition experts will be interested to know that "code letters" are disappearing from aircraft in R.A.F. service, their place being taken by an enlarged serial number two feet high which on the Canberras appears in white. The B.Mk 2 aircraft at Bassingbourn have excellent finish throughout the airframes. The Dowty undercarriage was singled out for praise and the Dunlop main-wheel tyres are giving good service.

A further bouquet should be accorded Rolls-Royce, whose Avons are capably maintaining the "R-R" standard of efficient and reliable service. Operation of the engine appears to give very little trouble, and its cartridge starter, in particular, is well liked; we witnessed many starts at Bassingbourn and the Avon picked up on one cartridge every time. The Avon compressor, by the way, is tapped directly to pressurize the cabin; the rear pressure bulkhead is just behind the navigators' seats, and to it is attached the nose undercarriage. In emergency, the canopy and roof over the crew may be jettisoned, the breaks occurring at the dotted lines seen in the photograph on the left.

The operating conditions for the crew appear good, and little fatigue should be felt even on long sorties—especially as the O.C.U. aircraft do not carry tip tanks. But there is no doubt that a dual Canberra is needed and, when the T.4 enters service—probably with Bomber Command at an O.C.U., rather than with Flying Training Command—it will be greatly welcomed.



Some of the staff: (left to right) F/L. J. A. Eddington, Chief Bombing Instructor; F/L. J. H. Simpson, D.F.C., Flying Wing Adjutant; S/L. W. R. Brooks, D.F.C., O.C. "B" Squadron; W/C. R. McFarlane, D.S.O., D.F.C., O.C. Flying Wing; S/L. D. C. Lowe, D.F.C., A.F.C., O.C. "C" Squadron; and S/L. R. W. Mathers, D.F.C., Chief Ground Instructor.

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From São Salvador to the West we shall fly via Bom Jesus de Lapa, a place for pilgrimage of the Catholics, a celebrated sanctuary at the banks of Rio S. Francisco, and likewise a point of commercial crossing between the Atlantic Coast and the West. From Bom Jesus we shall continue up to Santa Ana, Santa Maria, Correntina, returning on the same day. Means of transportation in these places are very scarce, due to the fact that there are no rail-roads and the few roadways become practically unserviceable as a consequence of a spell of bad weather.

From São Salvador to the South we shall use the very productive region of Tabasco and Cacao, stopping at the Cities of Sto. Antonio de Jesus, Jequié, Itacaré, Itabuna, Ilheus, Canavieiras, Belmonte and the cattle region of Itambé.

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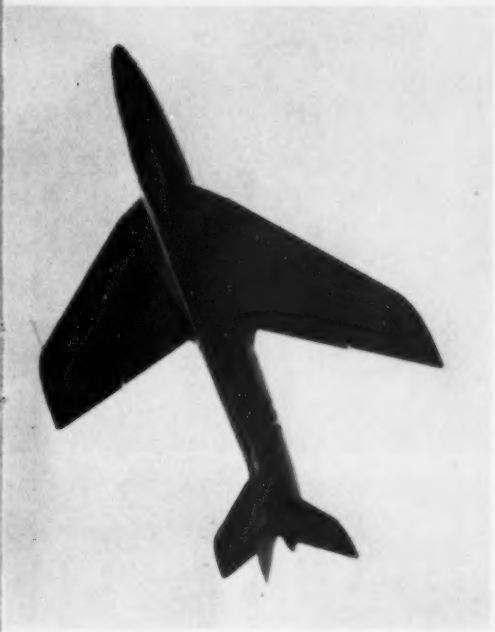


FARNBOROUGH STAR TURNS

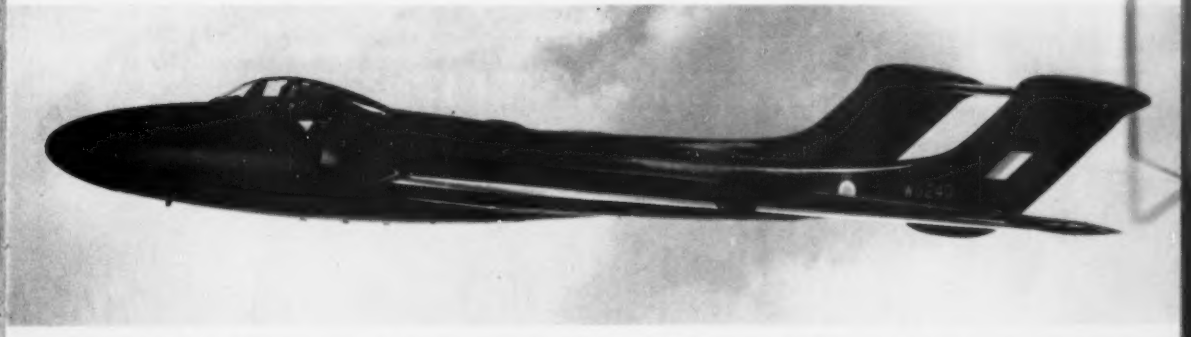
FEW of this week's Farnborough-goers will have an opportunity of studying the participating aircraft from any point above ground level; but here a number of them are seen "in full flight" (as our pre-1914 issues would have had it), while the Princess, on the next page, is depicted as she breasts the sunlit waters of the Solent.

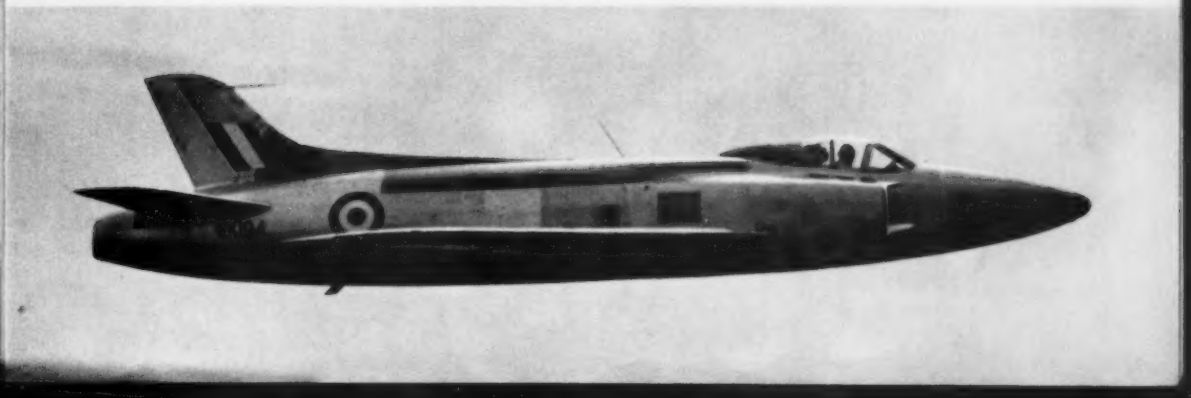
(Above) *Gloster Javelin night-and-all-weather fighter (2 A.-S. Sapphires).*

(Top left) *Hawker Hunter single-seater intercepter fighter (Rolls-Royce Avon).*

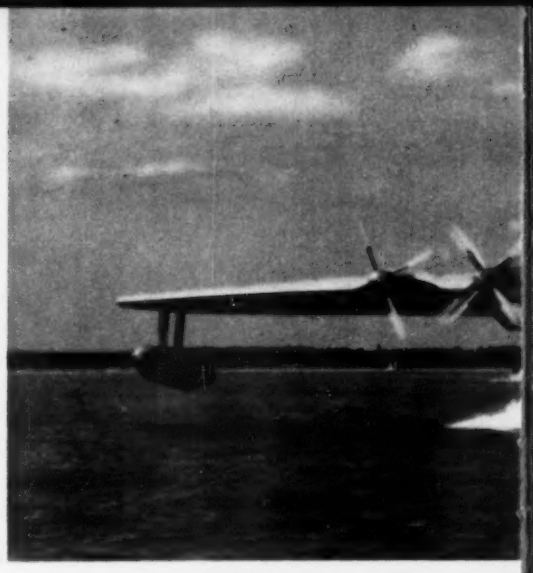
(Below) *De Havilland D.H.110 night-and-all-weather fighter (2 R.-R. Avons).*

(Bottom) *Latest prototype of Supermarine Swift intercepter (R.-R. Avon).*





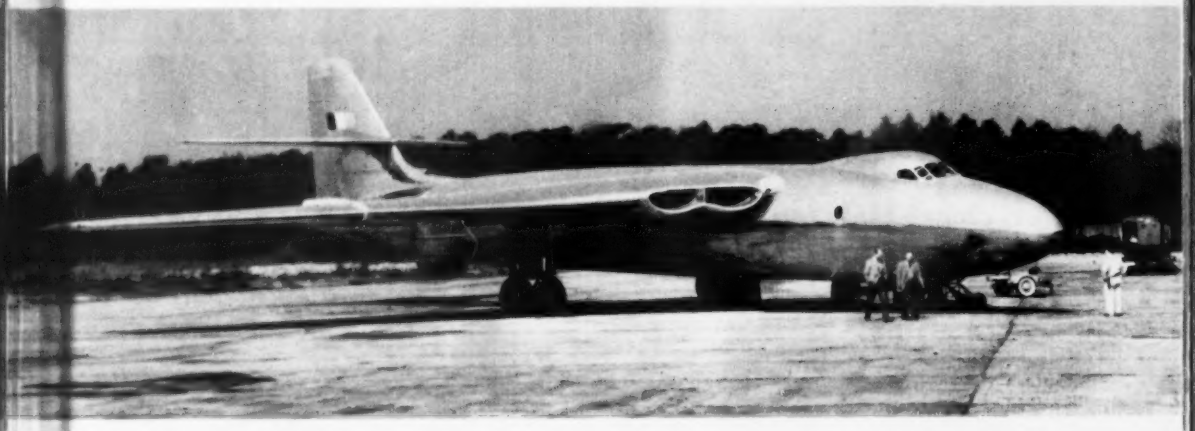
FARNBOROUGH STAR TURNS . . .



With two of her coupled Bristol Proteus and the two single Proteus units in operation, the Saunders-Roe Princess is seen on her taxying trials. The look-out man is at his post.

Immediately below is the second prototype Vickers Valiant bomber showing the redesigned air intakes for the Rolls-Royce Avon turbojets, and other modifications of a less drastic nature.

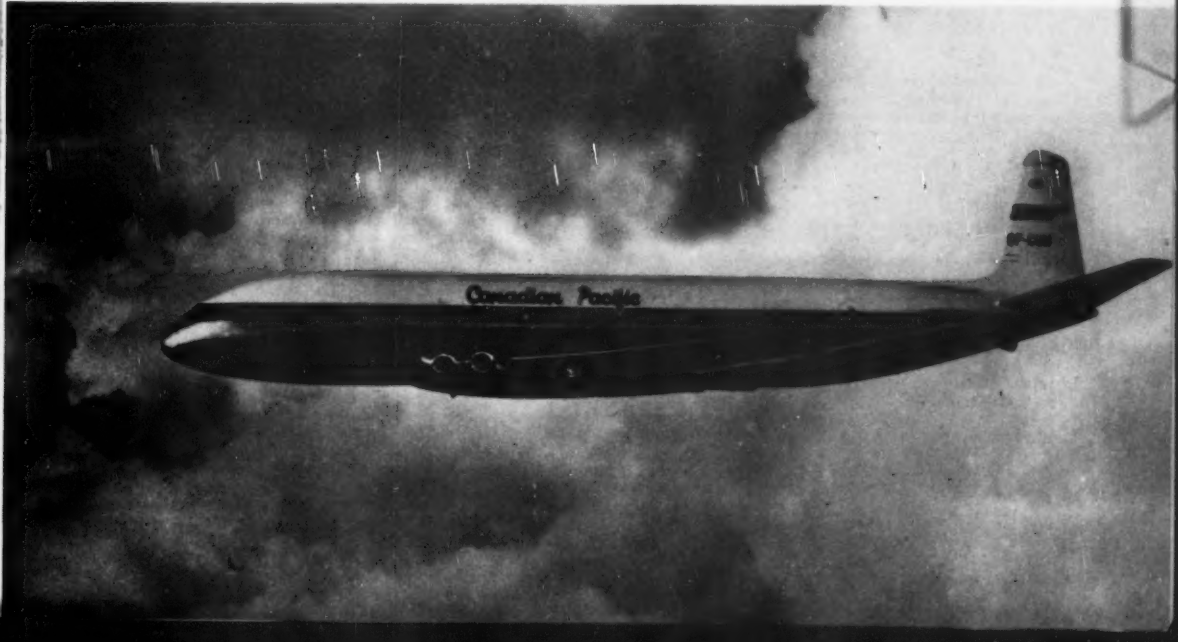
The study of the Bristol Britannia at the foot of the page was secured on one of its last pre-Farnborough test flights.

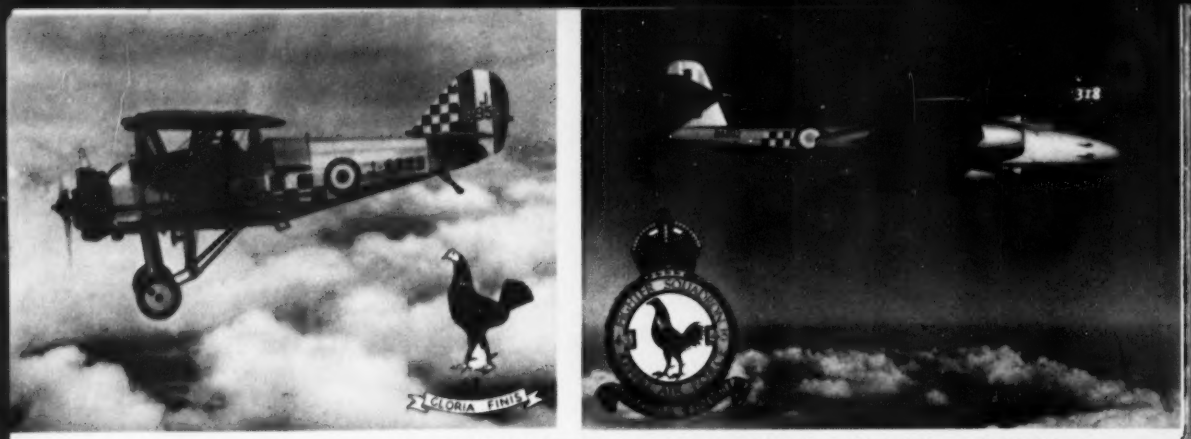


English Electric Canberra experimentally powered with two Bristol Olympus.

Bristol 173 helicopter with twin Alvis Leonides and twin rotors.

The first D.H. Comet IA is also the first Comet for Canadian Pacific Airlines. This version has increased tankage and water injection.





Twenty-two years apart : comparative photographs of S/L. C. N. Lowe flying his much chequered 1930 Siskin and S/L. E. M. Higson in his 1952 Meteor 8

THE FIGHTING COCKS

A FAMOUS FIGHTER SQUADRON REVISITED

By JOHN YOXALL

And sounding in advance its victory,
My song jets forth so clear, so proud, so peremptory,
That the horizon, seized with a rosy trembling,
Obeys me.

"Chanticler", by Edmund Rostand.

HAPPY pre-war days at Tangmere were recalled by a recent invitation to visit No. 43 Squadron, which for many years shared with No. 1 Squadron that very pleasant Sussex station. Now the unit lives hundreds of miles away, but any disappointment one felt was quickly lost in the prospect of flying in a Vampire 10 night fighter, loaned by another squadron, to No. 43 Squadron's present base.

How utterly lovely, and thrilling withal, is this new jet travel! An effortless climb to 27,000-30,000ft over what one must term the new landscape; then what seemed but a few minutes at this height, where, for a while, both coasts of Britain could be seen before the pilot started a gradual descent for his destination. By "the new landscape" I mean that we no longer fly "overweather" just above the clouds, but high enough above them to dwarf their dimensions and to give a wonderful feeling of elation at the completeness of man's conquest of the air. Certainly, on the day on which I travelled, the cloudscape was exceptional in its grandeur—it was only afterwards that we heard the tragic news of the Lynmouth disaster and floods in other parts, even as far north as Scotland, caused by the same weather conditions which offered such entrancing beauty when seen from above.

On our arrival, S/L. Higson, who has only recently taken over command of No. 43 from S/L. H. R. "Dizzy" Allen, was there to greet me and introduce me to the pilots in the crew room. Here, with sets of photographs which I took in 1930, 1932 and 1938 of the squadron's Siskins and biplane Furies, the pilots were briefed as to the manner in which these same formations could be translated into Meteor 8 flying. Little touches of finesse were added to defeat the optical illusions which make any stepped-up, vee or cruciform pattern appear out of shape; whether any of the pilots really liked flying straight into the efflux of the port Derwent of the Meteor immediately ahead is another matter. As one looked round at these young chaps in the briefing room it was impossible not to compare them with their predecessors, and, at the same time, realize how like them they were. Fighter pilots are fighter pilots, whether they fly Camels, S.E.5s, Siskins, Furies, Meteors or, I am prepared to guarantee, deltas – or any other device which may in the future be thought up for their use.

Whether the present generation of No. 43 Squadron pilots can fly better formations than those of the 1930s, each reader can judge for himself from the accompanying photographs. In this respect, however, it is well to remember that in 1930 the Siskin pilot had to cope with an open cockpit and had but an unreliable form of R/T. for communication. On the other hand the pilots today have a vastly more complicated aircraft. The Siskin has fewer than 20 gadgets and instruments as compared with more than 70 which the Meteor 8 pilot has to pull, push, turn or keep an eye on.

No. 43 has quite a remarkable history. It was first formed in 1916 at Stirling, under the command of Major W. Sholto Douglas (now Marshal of the Royal Air Force Lord Douglas of Kirtleside, chairman of British European Airways). One of its earliest pilots was Capt. C. F. Uwins, who was chief test pilot to the Bristol Aeroplane Co. for so many years and who is now managing director of the company's aircraft division. Of the squadron's first flight-commanders, one was Capt. W. V. Strugnell, one of the earliest pilots in the Royal Flying Corps, and another was Capt. A. Lees (now Air Marshal Sir Alan Lees—affectionately known throughout the Service as

Three echelons to starboard by No. 43 Squadron: (right) on Armstrong Whitworth Siskins over the Sussex countryside in 1930; (below) on camouflaged Hawker Furies at the time of the Munich crisis in 1938; (bottom) on their present-day Gloster Meteor F.8 intercepters.

"Uncle"). It is an odd coincidence that in 1930 (when the Siskin photographs on these pages were obtained) Sir Alan, as a flight lieutenant, was chief flying instructor at the station where No. 43 Squadron is now stationed. The third flight-commander was Capt. J. C. Russell, who retired from the R.A.F. in 1943 as A. Cdre. J. C. Russell, D.S.O.

The squadron's first aircraft were B.E.2cs and Avro 504 Ks, quickly changed for Sopwith 1½ strutters before the unit went to France to form, with No. 70 Squadron, No. 10 Wing in January, 1917. They saw action first in the Arras area and were the original squadron to perform fighter-bomber duties. One of the flight commanders at this time was Capt. Jack Scott, who before his death became a group captain. Paying tribute to him at the 40th anniversary dinner of the Central Flying School last May, Marshal of the R.A.F. Sir John Slessor said he felt that had Jack Scott lived he would have become a brilliant Chief of the Air Staff.

After a very intensive period of fighting in the Battle of Messines No. 43 was given a short rest. At the same time they were unfortunate enough to lose Major Douglas as a result of injuries he received in an air accident. He was succeeded by Major Dore.

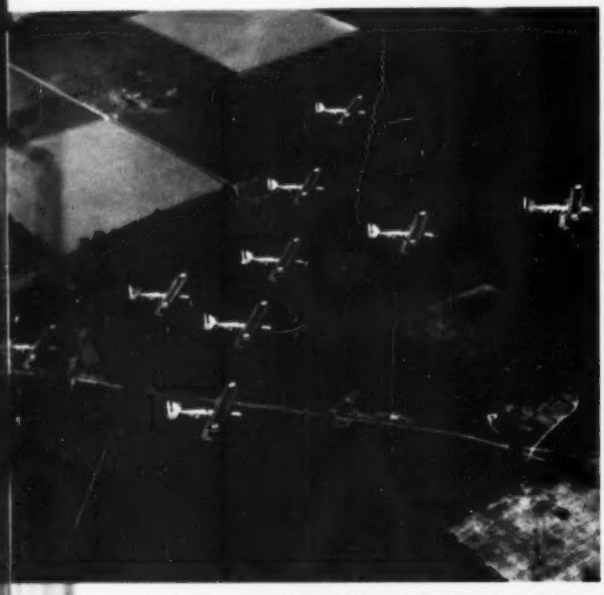
In September, 1917, Sopwith Camels replaced the obsolescent 1½ strutters and the unit again went into action, this

THE FIGHTING COCKS . . .

time at Cambrai in company with the first tanks ever to be employed.

The last German offensive in the 1914-18 war—against the British 5th Army front in March 1918—brought two record scores to No. 43. The first was the number of enemy aircraft shot down by the squadron in one day—12—and the second the number shot down by one pilot—six, by Capt. Trollope. This second record was later equalled by Capt. Woollett, who, in March 1928, was back with the squadron as second in command.

Two months before the end of the First World War the Camels were replaced by Snipes—only a very few squadrons were issued with these aircraft—and at the conclusion of hostilities the unit was sent to Spitalgate, near Grantham, reduced to cadre strength and disbanded on the last day of 1919.



Difficult both to fly and photograph—cruciform formations of Hawker Furies biplanes in 1932 (above) and Gloster Meteors of 1952 (top centre). An accurately flown cross with the fore and aft machines stepped up appears in perspective to form an unequal angled X.

C.O., Flight Commanders and the Mascot: F/L. J. A. Jackson, S/L. E. M. Higson (holding "Cocky") and F/L. K. E. Richardson.

Squadron records for the 1914-18 war show 110 enemy aircraft destroyed and 49 others driven down. In addition, 12 kite balloons were destroyed. The Squadron lost 52 pilots in action and flying accidents, and had a further 25 wounded.

No. 43 was re-formed six years later at Henlow on July 1st, 1925, and, starting where it left off, was equipped with Sopwith Snipes. Twelve months afterwards, a move was made to Tangmere, where it remained until the outbreak of the new war 13 years later. In the intervening period re-equipment had been carried out four times. Gamecocks replaced the Snipes in 1926, and Siskins issued in June 1928 gave place to Fury biplanes in May 1931. The Furies were still on charge when the war broke out and it was not until November 1939 that the first Hurricanes came. However, the Squadron soon put them to good use, for after a move to Acklington the squadron accounted for six Heinkel 111s while patrolling the North Sea and, after a move to Wick in February 1940, got a further five Heinkels of the same type and two Dornier 17s.

At the time of Dunkirk, No. 43 made a hasty return to their old home at Tangmere and during their most successful days in the battle destroyed 16 enemy aircraft on June 1st and

seven on June 7th. After a very short rest-period the squadron operated both by day and night in the Battle of Britain, in which they destroyed 45 enemy aircraft, but lost two commanding officers, S/L Badger, D.F.C., and S/L Hull, D.F.C. The latter had been in command for only six days. On September 8th, as a very depleted unit, it became non-operational until December 1940. Then followed a rather dull period at Drem and Acklington until June 1942, when they were once more back at Tangmere, but now in an intruder rôle, employed in operations with Havocs on "Turbinlite" night sorties.

In November of the same year the Squadron moved to the Mediterranean area and landed with but little opposition at

(Left) No. 43 Squadron's aerobatic team get the order "wheels up" as they take off for a practice flight. Their performance ends with a double "needle-threading" along the runway.

(Right) While performing for the R.A.F. Display in 1930, No. 43 Squadron Siskins were tied together during squadron aerobatics. The ropes and flags were still intact after landing.

The sleek lines of the black-and-white chequered Meteors serve as a foil to the rugged and majestic forms of the cloudscape.

"Squadron Vic" at 10,000ft. The curious roundel on the port wing of the nearest Meteor is caused either by a trick of the lighting—or perhaps by a National Serviceman having been discharged before finishing the red and white circles?

THE FIGHTING COCKS . . .

the Algiers airfield of Maison Blanche. Spitfires replaced the Hurricanes and by May 1943 No. 43 was operating as part of the Desert Air Force, with which it took part in the invasion of Sicily and Italy. During the first 12 months of service with D.A.F. the squadron scoreboard showed 29 enemy aircraft destroyed, four probables and 21 damaged.

A move was made to Corsica in August 1944, to share in the invasion of the south of France. There was no air fighting, but plenty of ground targets were offered until a month later, by which time the bomb line had moved out of range.

At the close of the war peace-time routine followed until January 1947, when the Squadron moved to Treviso, where, on May 16th, it was disbanded. A little under two years later, in February 1949, it was formed once more at Tangmere, by re-numbering 266 Squadron. Present at the re-forming was Lord Douglas and the ceremony was held on the base of No. 43 Squadron's hangar, which had been destroyed during the Battle of Britain.

NO. 43 SQUADRON'S SCOREBOARD 1939-1945

	Destroyed	Damaged
Enemy aircraft	159*	78
M.T.	104	151
Locomotives	4	7
Horse-drawn vehicles	20	193
Barges	20	29
Tanks	—	3
Tank transporters	—	1
Occupied buildings	55	54
Goods trains	19	70

*Plus 33 probables.

No. 43 Squadron, 1952. The pilots in the front row are: P/O. D. Harris, Sgt. G. G. Smith, F/O. D. H. Ross, P/O. R. E. W. Laverseed, F/O. K. A. Haining, Sgt. H. Watt, F/L. J. A. Jackson, S/L. E. M. Higson (Commanding Officer), F/L. K. E. Richardson, F/O. O. B. Hart, F/L. N. W. Heale, P/O. J. D. Vaughan, F/O. H. J. Gourley, P/O. W. Gunnyeon, P/O. M. W. Prior and F/L. W. Dickson (Eng. Officer). Absent at the time when this group was photographed were: F/L. J. H. J. Lovell, F/O. C. A. Simpson, P/O. W. N. Gilbert, Sgt. A. E. Madden, Sgt. R. G. Ross and Sgt. T. Lampitt.

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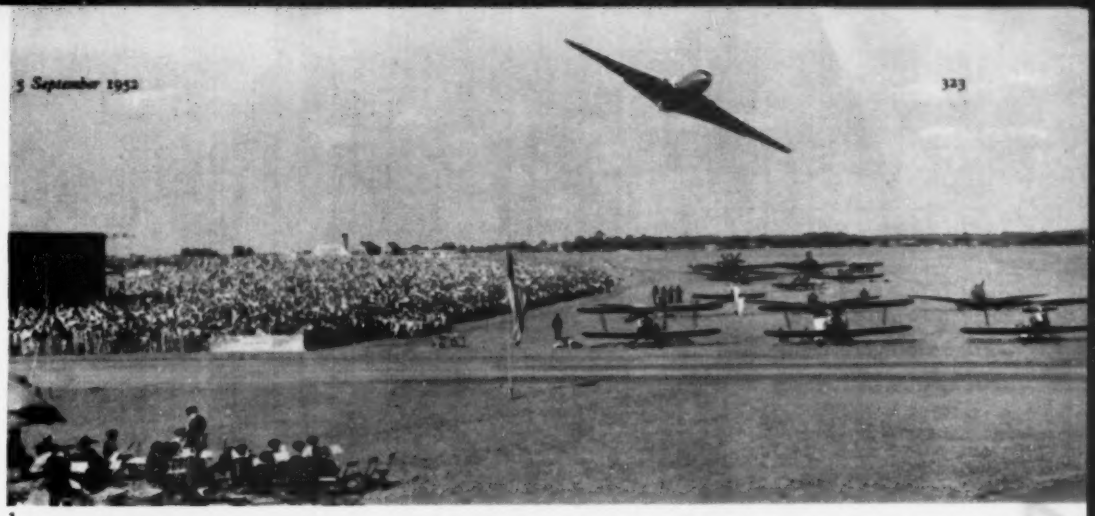

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LOOKING BACK at BAGINTON

AS a complement to the Siddeley Challenge Trophy Race, held at Baginton Airport on August 23rd, and described in *Flight* last week, the Coventry Corporation presented a varied programme of demonstration flying; a highlight (1) was the appearance of a B.O.A.C. Comet 1, pictured with flaps down as it banks away from a section of the crowd of 20,000. Beneath it are seen other participating aircraft. The spotless condition of the R.N.V.R. Seafire 47s, which demonstrated rocket assistance for take-off, can be seen in the right-hand view (2).

During the Siddeley Trophy Race, *Flight's* photographer secured one of the best air-racing pictures of the year (3), showing the Gipsy-Gemini of Nat Somers, who, paradoxically enough, was not in the race at all, for he had the misfortune to be disqualified right from the beginning of the race, having missed the scatter-point. Like other members of the "Throttle-benders' Union," Somers has waged a rather unequal war against heavy handicapping during the season. Perhaps the greatest disadvantage of the present handicapping system lies in the fact that the keenest pilots, who compete most often, reveal the performance of their aircraft to the full. The Coventry event, however, gave some consolation to two "Union" members—Ron Paine, who took third place in the Siddeley Trophy contest, and S L. Rush, third in the 1952 British Air Racing Championship.

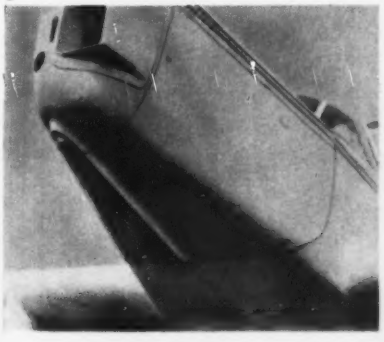
Another excellent action picture (4) shows the Hawk Trainer of L. S. Loveridge (Wolverhampton Aero Club) in a tight pylon turn. Among the most ambitious attempts to improve performance for the race was seen (5) in the Proctor flown by W/C. R. H. McIntosh; this showed an increase of 8.5 m.p.h. on its speed in the South Coast Race, which it won at 157.5 m.p.h. (the gain might have been much more had not McIntosh's compass led him slightly astray). Mr. Holloway, of Airwork, Ltd., who re-designed the Proctor's "sharp end," is to be congratulated, for the extractor-louvres (the only exits) between exhaust stubs actually give better engine-cooling on the ground, although the cowling is otherwise completely sealed.

2 3

"FLIGHT" PHOTOGRAPHS

4

5



This close-range air-to-air study of the Saab-210 Draken suggests tractability and ease of control. A fighter on similar lines, and without the purely experimental protuberances visible here can be imagined.

SWEDEN'S DOUBLE DELTA

Saab-210 Draken Completes Over 100 Flights

SINCE its first flight in December, 1951, the tiny, highly-unconventional, Saab-210 delta-wing research aircraft, known as the Draken, has completed more than 100 successful test flights, and the makers have now released certain additional particulars, together with the photographs reproduced here. The salient design features are, of course, the remarkably low aspect-ratio, and the totally new plan form, which is made up of two distinct triangles, giving a "double-delta" effect.

Designed and built in only 18 months, with an eye to simplicity and low cost, the Draken is an all-Swedish product except for the power unit, which is a British Armstrong Siddeley Adder axial-flow turbojet giving a static thrust of 1,050 lb. The aircraft is intended only for relatively low-speed flying (though it is said that the top speed is "about the same as for the fighters of World War II vintage") and is fitted with a wide range of measuring equipment, including an automatic observer and an oscillograph for the recording of rudder forces, flight paths, etc. Unofficially, it is reported that the machine is a half-scale model for a projected Saab fighter.

The elevons of the Draken are operated by a hydraulic booster system which, like the pilot's ejector seat, is of Saab conception. One of the most interesting points about the design is the possibility of moving the main undercarriage wheels backwards or forwards for test purposes; it is also possible to shift the centre of gravity during flight by transferring liquid between trim tanks in the nose and tail. Although the normal landing run is described as "very reasonable," a drag parachute is carried in the tail.

The Draken was built under the supervision of Mr. Lars Brising, Saab's chief engineer, and the project engineer concerned was Mr. Erik Bratt. The machine has been developed in close co-operation with the Royal Swedish Air Board, and research facilities have been provided by the Aeronautical Research Institute and the Royal Institute of Technology of Stockholm. Test flying has been primarily the responsibility of B. R. Olow, Saab's chief test pilot, though Mr. Olle Klinker, development test pilot, has also played a part. The tiny machine has also been flown by personnel of the Royal Swedish Air Force Experimental Centre at Malmslätt.

B. R. Olow (Saab chief test pilot) and J-29 fighters in the background give scale in this most striking picture of the Draken. Note that the nose and starboard wing are thoroughly tufted for airflow investigation.

The Valiant

The

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Ejection Seat designed for

high speed aircraft

Martin-Baker

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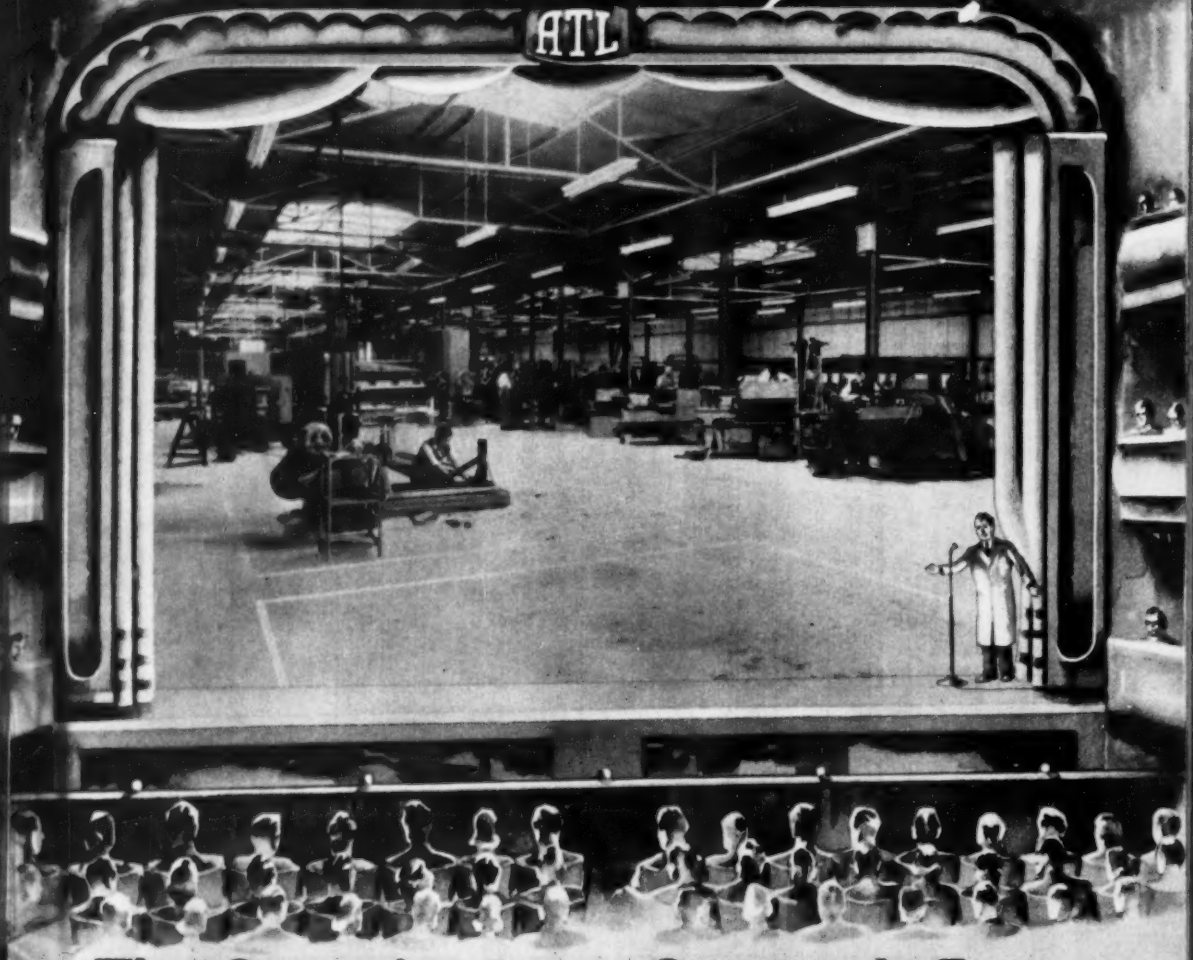
HIGHER DENHAM NEAR UXBRIDGE MIDDLESEX

The Show must go on!



The Stage is set at Stansted, Essex

The scene is an actual photograph of our machine shop in full production at Stansted, Essex. With 132,000 sq. ft. of floor space available at this base, further capacity exists for additional contracts. Your enquiries are invited.

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CRUSADER

Aircraft Construction and a Ghost Turbojet for Water-speed Record Attempt

TO readers familiar with the amazing rise in aircraft speeds since pre-war days, the corresponding increases in the world's record water-speed figures may not seem impressive. Over the past 13 years the speed has increased by less than 40 m.p.h., and now lies at 178.4 m.p.h. This indication that existing types of boats could not be expected to produce any marked improvement in performance has brought about the development of a radically different design, *Crusader*, which, as the photographs and cut-away drawing reveal, is of considerable interest from the aeronautical as well as the nautical point of view.

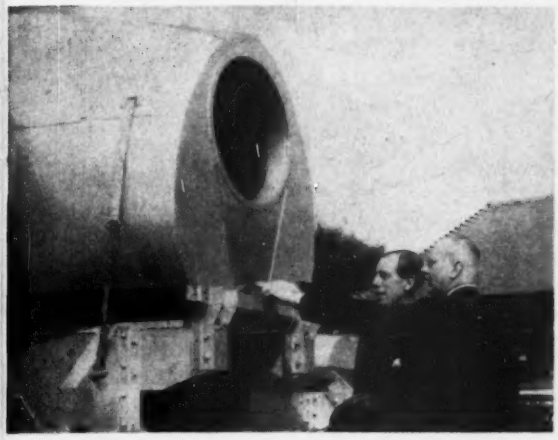
Past record-breaking boats have all had wide, curved Apel-type hulls with built-in sponsons and a raised step, and have suffered from a tendency to become airborne at speeds above 150 m.p.h. should the angle of incidence of the hull rise on striking a wave. Another snag in conventional practice concerns the propeller, the efficiency of which falls off rapidly as speeds are increased

To overcome these difficulties, a new approach involving both a new hull form and different source of motive power was proposed by Reid Railton, technical adviser to John Cobb. An aerodynamically stable hull, insensitive to small changes in angle of incidence, was to be employed, and power was to be provided by a turbojet aircraft engine.

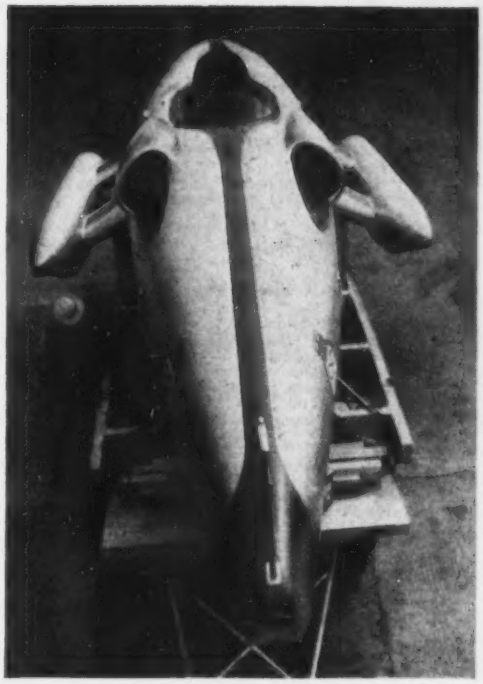
The original design consisted of a cylindrical cigar-shaped "fuselage," with vertical fin, mounted on four "skis." Considerable testing and development took place to find the best shape and positions for the planing surfaces, with particular reference to the avoidance of porpoising, and successive stages were the removal of the after ski, the replacement of the skis by floats, the fairing of the forward float into the hull, and the modification of the hull shape.

A one-sixth-scale model of the final version, powered by a rocket developing 30 lb thrust for 20 sec and supplied by R.A.E., Farnborough, was tested in 1951 in the Admiralty's torpedo-testing tank at Haslar, and achieved a speed of 97.5 m.p.h.

The full-sized version, designed by Cdr. Peter du Cane, and built by Vosper, Ltd., Portsmouth, has recently been completed. Not only is this boat of a shape strongly suggestive of aircraft practice, but the majority of companies which have contributed to its construction—listed at the end of this article—are closely associated with the manufacture of aircraft. In addition, technical assistance was provided by Mr. Peter Crewe (Saunders-Roe chief hydro-dynamicist), and by Vickers-Supermarine, in problems of planing surface loads and hull stresses respectively. The power unit is a de Havilland Ghost 48 Mk 1, on loan (at the request of Major Halford) from the Ministry of Supply.



Driver John Cobb (right) and Reid Railton, who suggested the revolutionary design, examine the after end of the boat.



Loch Ness monster: This startling head-on view shows the unconventional lines and smooth surface finish of Cobb's new boat.

It is with *Crusader* that John Cobb hopes to regain the water speed record for Great Britain in the near future. Before the boat's road journey north to Loch Ness, where preliminary trials and the actual record attempt will be held, we were invited to New Malden, Surrey, to view the boat and meet the men associated with it. To one seeing this craft for the first time, it appeared more shapely and rather larger than might have been expected.

The whole structure, in wood and light alloy, has much in common with that of an aircraft, and it also bears the same outward signs of strength as do modern high-speed aircraft.

The main hull consists of two thin skins of birch plywood, glued to longitudinal stringers which, in turn, are attached by angle brackets to birch plywood frames. The outer covering is of doped fabric. A clad aluminium alloy (D.T.D. 610B) has been used for all highly stressed surfaces and members, while the planing surfaces have been reinforced with NP 5/6 aluminium-alloy sheeting.

The Ghost engine, developing 5,000 lb static thrust, is mounted between the gunwales or main stringers abaft the forward strong-beam, and the two air-intake scoops, conventional as far as aircraft practice is concerned, are positioned on the upper surface of the hull slightly below and ahead of the open cockpit. The fuel tank is located directly beneath the cockpit.

The two rear floats or sponsons have flat lower surfaces, are slab sided, and carry small stabilizing fins inboard. Each is attached to the hull by two faired box-section cantilever arms.

In the cockpit a quick-release aircraft harness is provided for the driver who has, in addition to the steering wheel and hand and foot power controls, the usual high-pressure and low-pressure fuel cocks to be found in a jet aircraft. An r.p.m. indicator and jet-pipe temperature gauge of the type normally used with the Ghost are mounted on the instrument panel. On a short mast on the nose of the boat is a pitot head for the A.S.I., which provides the driver's only indication of speed.

For rapid deceleration in emergency a braking parachute can be released from its stowage behind the driver's head; a yoke-type

CRUSADER . . .

harness fitted around the rear strong-beam is attached to two eyes on the rear cantilever arms. According to the marine-record rules no aerodynamic controls are permitted, so the boat is guided by a diminutive light-alloy rudder machined from the solid and situated beneath the cockpit and just behind the step formed by the after-end of the forward planing surface.

From the model tests at the Haslar tank, there is every hope that the craft will be thoroughly stable in the water, but no full-scale tests have yet been made. John Cobb told us that he was prepared for a mild wetting from spray from the sponson tips, until the boat rose on to its "steps" (the after ends of the three planing surfaces) at about 50 kt; but he believed that the Ghost air intakes would remain clear of spray, owing to the action of the spray-guard strips recently fitted to the hull.

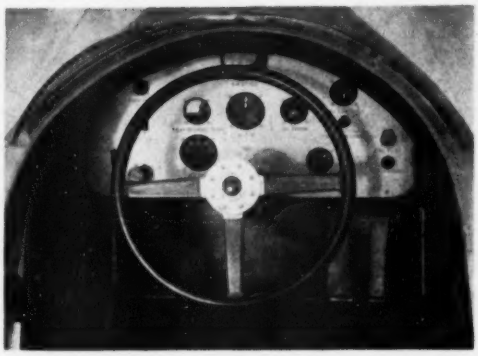
Hopes for the boat's speed are high. The American piston-engined screw-driven boat which holds the present record (at 178.4 m.p.h.—with over 8,000 b.h.p. and only 25 per cent propeller efficiency) is believed by its sponsors to be capable of nearly 200 m.p.h. While the *Crusader* model speed of 97.5 m.p.h. corresponds to a full-scale speed of approximately 240 m.p.h., the designers anticipate merely "more than 200 m.p.h." If necessary, Major Halford told us, the Ghost's thrust could be increased to produce a speed of, perhaps, 230 m.p.h.

For the Ministry of Supply's ready co-operation in this project all connected with the boat are grateful. That the Ministry's interest is inspired solely by possible warlike applications of this type of craft we do not accept—engineering progress, research into high speeds on water, and the possible recapture for Britain of the speed record are obviously worthwhile ends in themselves. We look forward with interest to the performance of this aerodynamic craft at Loch Ness.

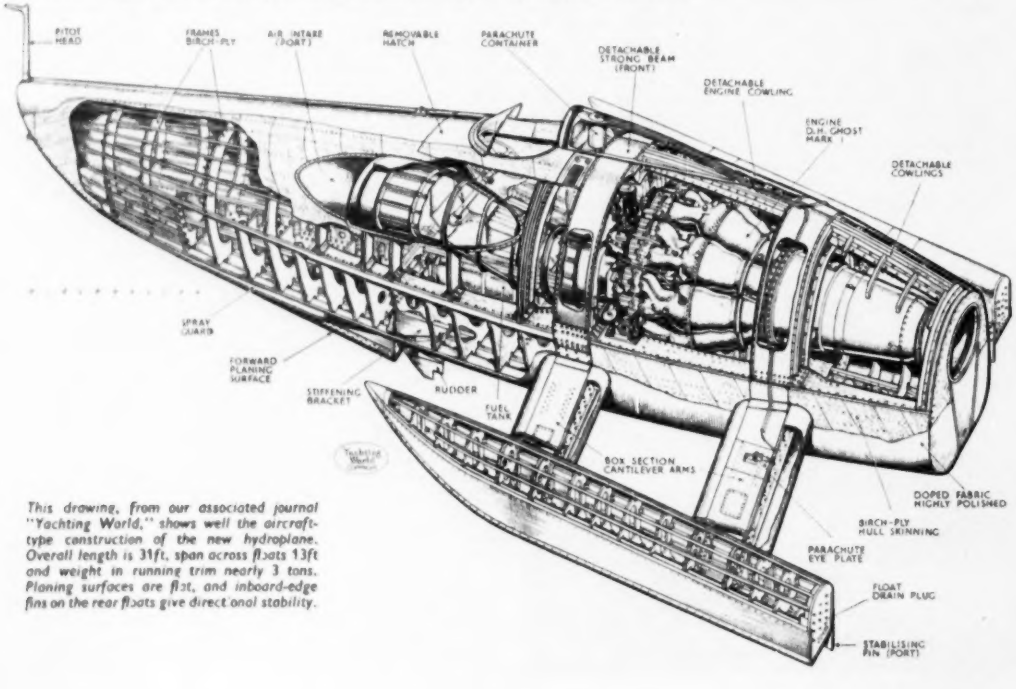
On Thursday of last week *Crusader* was given an engine run beside Loch Ness; all went well, and it was hoped to launch the craft on Friday. Weather permitting, John Cobb intended to make his first trial runs later the same day.

The following is a list of the firms—most of them well known in the aircraft industry—which have supplied *Crusader*'s materials, components and accessories:—

Adamant Engineering Co., Ltd., steering gear; Alford and Alder, Ltd., steering-gear drag link; Aviation Developments, Ltd., Chobert rivets; N. S. and M. C. Barton, Ltd., nuts and bolts; Bluemel Bros., Ltd., steering wheel; British Aluminium Co., Ltd., aluminium; J. Burns, Ltd., plastic captive nuts and screws; Cellon, Ltd., paint; The Clip-On Co., Ltd., air ducts; De Havilland Aircraft Co., Ltd. (Airspeed Division), doped fabric; De Havilland Engine Co., Ltd., engine; Fina Petroleum Products, Ltd., London, W.1, fuel; Thos. Firth and John Brown, Ltd., material for rudder; Firth Vickers Stainless Steels, Ltd., material for fin; Films and Equipment, Ltd., plugs and sockets; Flexo Plywood Industries, Ltd., plywood angles; P. Frankenstein and Sons (Manchester), Ltd., life-jacket; G. Q. Parachute Co., Ltd., parachute gear; Graviner Manufacturing Co., Ltd., fire-extinguishing system; Guest, Keen and Nettlefolds, Ltd., screws and Aerotight nuts; King Aircraft Corporation, cowling fasteners; Joseph Lucas, Ltd., electrical equipment; Wm. Mallinson and Co. (late Aeronautical and Panel Plywood), plywood; Manganese Bronze and Brass Co., rudder-bearing bush; The Palmer Tyre, Ltd., engine piping; David Powis and Sons, Ltd., boat nails; R. F. D. Co., Ltd., buoyancy gear; Rubery, Owen and Co., Ltd., stainless-steel bolts; L. A. Rumbold and Co., Ltd., seat and upholstery; Saro Laminated Wood Products, Ltd., nose fairing; Smiths Industrial Instruments, Ltd., instruments; J. Stone and Co. (Deptford), Ltd., rivets; Teleflex Products, Ltd., controls; Thomson and Taylor (Brooklands), Ltd., manufacture of rudder and fins; Tungum Sales Co., Ltd., engine piping; C. C. Wakefield and Co., Ltd., Castrol oil; Wokingham Plastics, Ltd., windscreen.



Neat layout of the cockpit: the hand power-lever is on the port side, and foot control on the starboard.



This drawing, from our associated journal "Yachting World," shows well the aircraft-type construction of the new hydroplane. Overall length is 31ft, span across floats 13ft and weight in running trim nearly 3 tons. Planing surfaces are flat, and inboard-edge fins on the rear floats give directional stability.

ROTOL Propellers
exclusively specified for the Percival Provost, the new basic trainer for the Royal Air Force—and also available for all versions of the Percival Prince.
GLOUCESTER · ENGLAND

ACHIEVEMENT

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double crossing by air
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has been successfully made by
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ROLLS-ROYCE
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FOR SPEED AND RELIABILITY

HERE AND THERE

PRIME MINISTER NEHRU—seen here with Capt. A. M. Majendie—enjoyed a 90-minute tour over the Himalayas when B.O.A.C. gave demonstration flights from Delhi in a Comet. It visited there on its proving flight for the Delhi-Singapore section of the Far East run.

Ministry Post for A. Cdre. Banks

IT was announced last Tuesday night that A. Cdre. F. R. Banks, C.B., O.B.E., F.R.Ae.S., M.I.Mech.E., has been appointed Principal Director of Engine Research and Development at the Ministry of Supply. He has been specially released by the Associated Ethyl Co., for whom he was general manager and chief engineer. During the war, A. Cdre. Banks was at M.A.P., first as Director-General of Engine Production and later as Director of Aero Engine Research and Development.

Universal Freighter Ordered

CONGRATULATIONS to Blackburn and General Aircraft, Ltd., on the news—announced last week-end by the Ministry of Supply—that a production order has at last been placed for the Mk 2 (Centaurus-powered) Universal Freighter. It is rumoured that the order will be for between 12 and 20 aircraft. This will also open the way for orders from Silver City Airways (three Freighters) and other operators. Deliveries should begin in about two years.

Short Brothers' New Chairman

THE Minister of Supply has appointed Rear-Admiral M. S. Slattery, C.B., R.N. (Retd.) to be chairman of Short Brothers and Harland, Ltd., Belfast, the Government-controlled aircraft company. He succeeds Sir Edward Herbert, who has resigned owing to the greatly increased pressure of his other business interests, which largely concern the development of export trade. Admiral Slattery has been managing director of the company for the past 4½ years, before which he held a number of appointments in the Admiralty, the Ministry of Aircraft Production and the Ministry of Supply in connection with the development and supply of aircraft for the Royal Navy.

Before Famous Scientists

AT the British Association Meeting in Belfast next week, Mr. H. Knowler, chief designer to Saunders-Roe, Ltd., is to lecture to the engineering section on "The Future Development of the Flying-boat Airliner." The paper will be read on September 8th.

Farnborough Prices

FOR the benefit of those attending Farnborough on any of the three "public" days—today (Friday), Saturday and Sunday, we briefly repeat here details of admission prices. Today the charge is 10s (children 5s); cars, with normal number of occupants, will be admitted at £3 inclusive. On the two remaining days the charge will be 5s (children 2s 6d) or £1 10s for cars with occupants. Payment may be made at the gates or in advance through Auto-Parks, Ltd., 1 Maclise Road, London, W.14 (Shepherd's Bush 5385). Notes on reaching Farnborough, and a map of the enclosures, appeared on page 230 of our special number last week. On each day the gates open at 10 a.m. and flying begins at 3 p.m.

Spraying Quintet

THREE Auster Aiglet aircraft of Aerial Spraying Contractors, Ltd., of Boston, Lincs, will start a 4,000-mile flight to the Sudan on September 8th. They will join with two other of the company's aircraft, at present in Nairobi, to spray a large acreage of cotton on the banks of the Blue Nile. This is the third successive year in which A.S.C. have contracted to spray cotton in the Sudan.

Boeing Jet Transport—in '54

THE announcement that the Boeing Airplane Company are building a jet-powered transport aircraft was made on August 30th by Mr. William M. Allen, president of the company, who said that the prototype would be ready for demonstration in the summer of 1954. The estimated expenditure involved is approximately 20 million dollars, and the target date is quoted as "late 1956 or 1957."

Unlucky Strike

IT is now known that the "Mighty Mouse" air-to-air rocket which destroyed a B-17 Fortress over the Gulf of Mexico on August 24th was an inert practice missile. It was fired from an F-86D Sabre (the gunless, radar-equipped model) whose pilot, Col. A. R. Debolt, mistook the B-17 "mother" aircraft for the QB-17 target drone which was flying one-and-one-half miles astern. The missile apparently hit a fuel line or petrol tank; only two of the crew of eight are known to have survived.

Plain Speaking

THE Preparedness Sub-committee of the U.S. Senate, in a report issued on August 27th, alleges a serious lag in the strengthening of American air power. Pointing out that the number of military aircraft three months ago was less than that before the Korean war, the report blames senior officials for serious neglect of the country's air defence and for the resulting threat to national security. The sub-committee recommends an emergency programme to reach the original goal of 126 modern combat wings plus 17 troop-carrier groups and supporting units, and a re-appraisal of the Air Force - Army - Navy balance of strength as it relates to atomic warfare.

Voice of Experience

THE Sea Fury pilot who recently shot down a Communist Mig-15 over North Korea—Lt. Peter Carmichael, R.N.—is to lecture on air tactics to naval fighter pilots at R.N. Air Station Culdrose.

Fiat to Make J-35 Spares

AS forecast a fortnight ago in a *Flight* article on the Italian aircraft industry, the Fiat Company has now been licensed to manufacture spare parts for Allison J-35A-29 engines in use in Republic F-84G Thunderjets. The agreement was negotiated by representatives of the U.S. Air Force, Fiat and Allison.

Low-flying Sentence

AT a court-martial at Pershore, Worcestershire, last week, an R.A.F. pilot officer who was alleged to have repeatedly dived an Anson to within a few yards of the station buildings at Desford Airfield was sentenced to be dismissed the Service. An instructor said that the officer showed promise of more than average flying ability, but after about six weeks of solo flying had become "a little difficult to instruct because of over-confidence." The sentence is subject to confirmation.

American Probing

SUCCESSFUL development of a flight-refuelling technique for carrier-based aircraft was announced last week by the U.S. Navy. This in itself does not appear remarkable, but a most significant sentence in the release ran "The technique has been modelled upon the British drogue-and-probe method." Although this method—developed by Flight Refuelling, Ltd.—does not equal the transfer-rate of the Boeing "flying boom" system of the U.S.A.F., it is much cheaper. A further advantage is that more than one aircraft can be refuelled at once from the same tanker.

Space Experts Confer

NOW in progress in Stuttgart is the Third International Congress on Astronautics; the second was held in London a year ago. Members of the British Interplanetary Society are presenting the following papers: "Cost and Availability of High-energy Propellants" (G. V. E. Thompson, B.Sc.,

ROCKETED: A striking impression of an Avro CF-100 taking off under the combined thrust of two Orendas and six jato bottles. In this test, made at R.C.A.F. Station Uplands, Ontario, the CF-100 took off with a full load of fuel and armaments, plus two 1,000 lb bombs (visible under the wings) in half the normal distance.

HERE AND THERE . . .

A.R.C.S.); "Interorbital Transfer of a Rocket" (D. F. Lawden, M.A.); and "Sensory Perceptions of the Weightless Condition" (A. E. Slater, M.A., M.R.C.S., L.R.C.P.). The British delegation is led by A. C. Clarke, B.Sc., F.R.Ae.S. (chairman of the B.I.S.), supported by L. J. Carter, A.C.I.S. (secretary) and Dr. L. R. Shepherd, Ph.D. (technical director).

On the Way

THE Secretary of the U.S. Navy, Mr. Dan Kimball, said last week that he hoped either the third or the fourth 60,000-ton aircraft carrier of the *Forrestal* class would have atomic propulsive power. The keel of the 3,200 m (1,71 m) *Forrestal* was laid at Newport News last month; work on the second vessel will shortly begin at Brooklyn.

Vintage Vigour

THE Vintage Aeroplane Club's rally at White Waltham last Saturday proved unusual in that something was missing—the customary fierce opposition which the club has so far received from the weather. Amazed, the organizers went ahead with spot-landing and supply-dropping contests, and a parachute descent by Miss Phil Weir. A dog-fight between Gladiator G-AMRK and Hart G-ABMR preceded the formation competition, won by the Hawker team (Hurricane, Hart and Tomtit). Individual aircraft, including the 1924 Hawker Cygnet, then showed their form. The alarming and incomparable performance of Prince Cantacuzene's Jungmeister brought the flying part of this pleasant and previously leisurely meeting to a close.

IN BRIEF

THE Fairey Aviation Co., Ltd., announces that Mr. C. C. Vinson, a joint assistant managing director, has by mutual agreement resigned from the board of the company and its subsidiaries.

* * *

Mr. Eric A. Dymond, A.M.I.Mech.E., A.M.I.E.E., A.F.R.Ae.S., has resigned from the board of Sangamo Weston, Ltd., after completing 27 years' service with the company.

* * *

Mr. Ernest Nash has joined Ingersoll (Manufacturing), Ltd., as technical sales representative for the company's aircraft locking-devices. For the past 12 years Mr. Nash has been with the Hunting Group, and was until recently works manager of Percival Aircraft, Ltd.

* * *

Omitted from our list of Farnborough "Static Show" exhibitors last week was the name of Elliott Brothers (London), Ltd., who were allocated a stand after the S.B.A.C. list had been circulated. On Stand 116 the firm are showing a very full range of strain-gauge and other test equipment, research recorders, an auto-stabilizer for high-speed aircraft, and a range of miniature aircraft instruments.

Pulsometer fuel booster pumps, satisfactorily operated in B.E.A. Vikings for 1,000 hours between overhauls, are now being tested for 1,200-hour service.

* * *

A new catalogue produced by F. J. Edwards, Ltd., Euston Road, London, N.W.1, describes the extensive "Besco" range of sheet-metal workers' hand-tools.

* * *

Ekco Search Radar, which utilizes radar "map-painting" technique to delineate dangerous cloud formations and high ground, has been ordered for the Saunders-Roe Princess.

* * *

It is stated in the autumn issue of the B.I.C.C. Bulletin, published by British Insulated Callender's Cables, Ltd., that approximately 15 miles of the company's "Pren" aircraft cables are used in the Comet's electrical system.

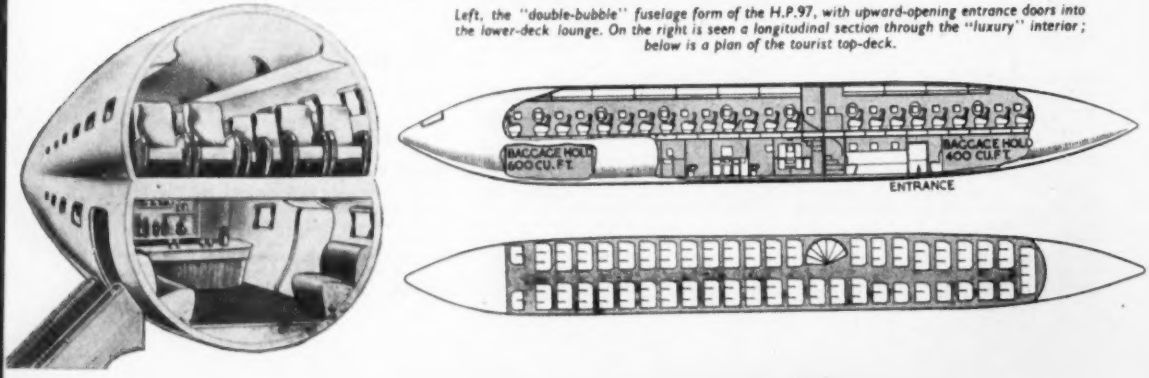
* * *

A new product of J. H. Sankey and Son, Ltd. (Refractories Division, Ilford, Essex), a vitrified buff tile with acid- and alkali-resisting properties, is described in a leaflet. The tiles are especially suitable for floor surfaces and storage-tank linings.

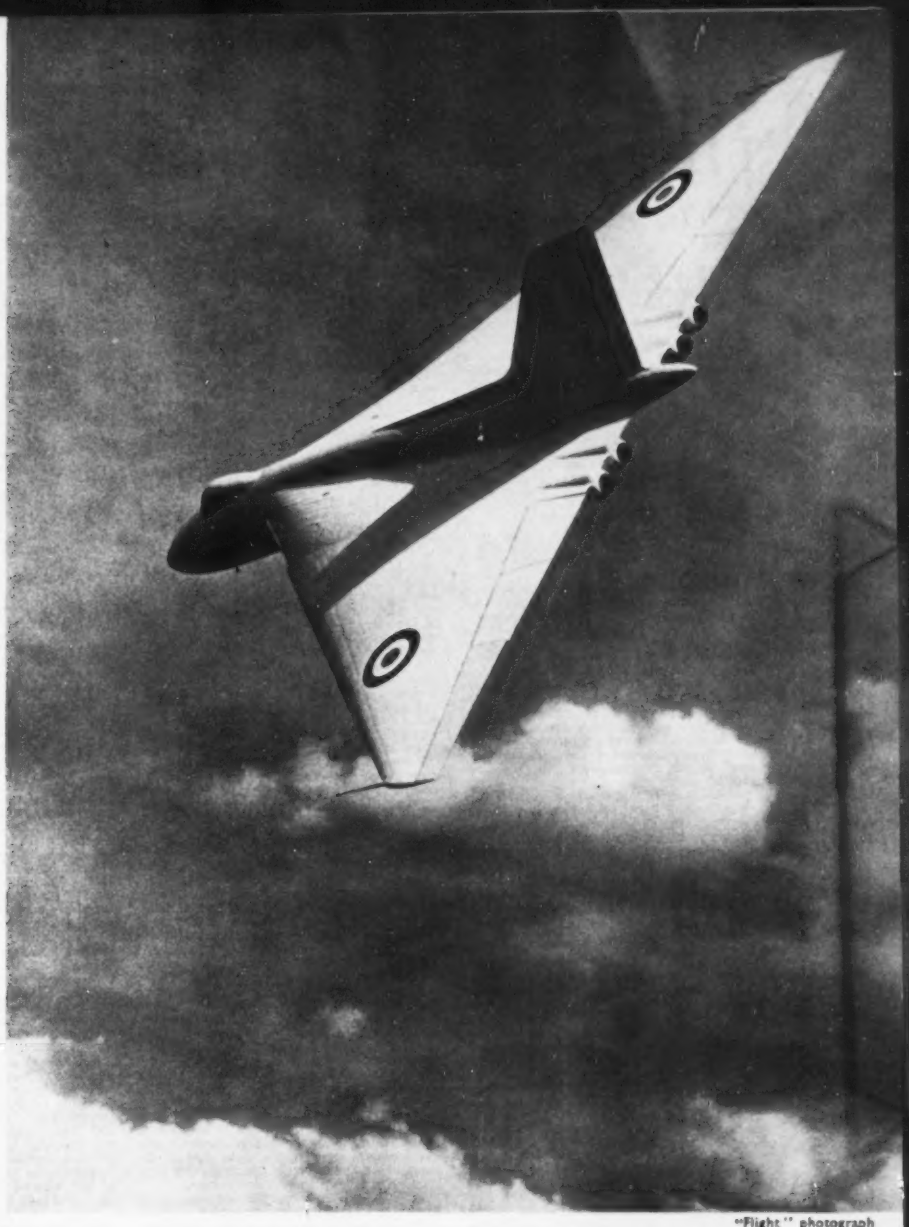
HANDLEY PAGE 150-SEAT AIRLINER PROJECT

ANNOUNCED in a special Farnborough issue of the *Handley Page Bulletin* is the projected H.P.97, a four-jet airliner with a payload of 50,000 lb. Two alternative seating layouts are planned, a 96-seat luxury version and one of 150 seats for tourist travel. The power units are unspecified, but certain performance estimates are quoted. For the transatlantic route from New York to London, 122 passengers plus baggage would be carried, in 6½ hours' flying time, at a direct operating cost of one penny per passenger mile. Westbound, 117 passengers would be carried, taking 7½ hr by reason of the prevailing winds. The 2,210 miles from Cairo to Karachi would be flown in 4½ hr, with 148 passengers plus baggage, and 8,500 lb of freight and mail. From Sydney to Singapore, the capacity over the 3,915 miles would be 94 passengers and baggage. Direct operating costs over these two routes would be 0.7 and 1.8 pence per passenger mile respectively.

The double-decker fuselage is of "double-bubble" cross-section, and has a freight capacity of 1,000 cu ft. In the luxury version, the passenger seats are spaced two on either side of the central gangway in the upper deck; for tourist travel, triple seats on each side of the gangway will be used, and 16 additional lower-deck seats are fitted. The *Bulletin* gives sketches and diagrams of the interior layout of the airliner, and a sectioned model on the makers' Farnborough stand indicates that the design will incorporate a high tail-plane and sharply swept wing-roots each with a pair of built-in turbojets.



Left, the "double-bubble" fuselage form of the H.P.97, with upward-opening entrance doors into the lower-deck lounge. On the right is seen a longitudinal section through the "luxury" interior; below is a plan of the tourist top-deck.



"Flight" photograph

SUPER BOMBER

NEVER has a more splendid and exciting display been staged than that seen at Farnborough this week. A glance at the pages devoted to an appraisal of the aircraft and their demonstrations confirms this beyond doubt. In almost every aircraft class there are world-beaters to admire; the great Princess makes a graceful entry and the sound barrier yields to Hunter and 110. Notwithstanding all this, however, we have thought it fitting to devote this page solely to an occasion which promises to become historic—first public appearance (over Farnborough on Tuesday last) of the Avro 698, four-jet delta, superb example of British design skill, foresight, courage and workmanship. While in no way detracting from the many other magnificent performances, it has, nevertheless, stolen the show and opened the eyes of the world.

THE S.B.A.C. DINNER

Important Speech by the Minister of Defence

JUST as the S.B.A.C. Display is a unique flying occasion, so the annual dinner given by the Society for its guests is a unique international gathering. This year nearly 1,000 guests, representing no fewer than 94 countries, attended the Dorchester Hotel, London, last Monday evening. Viscount Alexander of Tunis was the guest of honour among a company distinguished not only in aviation but, collectively, in most other spheres of life also.

The president of the Society, Mr. Hugh Burroughes, F.R.Ae.S., welcomed the guests, who included hundreds from the United States and many others from the N.A.T.O. countries. Among Government senior officials he was able to mention by name were Mr. Duncan Sandys, Minister of Supply, "with whose Ministry we have so many close links and to whose support and co-operation we owe so much"; the Ministry, said Mr. Burroughes, was the buying agency for the Government, and the two main user departments were represented by Lord de L'Isle and Dudley (Secretary of State for Air) and Mr. Lennox Boyd (Minister of Transport and Civil Aviation). Welcome, too, were Sir Archibald Rowlands (Permanent Secretary of the Ministry of Supply) and Air Marshal Sir John Boothman (Controller of Supplies, Air)—"towers of strength and wisdom in their difficult tasks, experienced and often courageous in their decisions." He was especially grateful, also, to the Director of the Royal Aircraft Establishment, Mr. Hall, and to all his staff.

Mr. Burroughes said that 1952 might well be remembered as a year of outstanding importance. The turbine-powered airliners of which prototypes have been shown at earlier S.B.A.C. displays were now going into service and were already attracting custom from major airlines in many parts of the world.

"The magnificent Comet has in the past few months blazed a new path in civil aviation," he continued, "and significant lines of development in combat aircraft have brought us into the realm of supersonic speed. A great step forward in design is evident in the delta-winged aircraft, the new bombers, and the research aircraft which will be on view tomorrow. All these have been developed and made here with British skill, British inventive genius, British capital and British labour. It seems to me that all these things entitle us this year to stake a very strong claim for leadership in many aspects of world aeronautics. They have been due to the industry but also to the help and foresight of Governments.

"The Display itself is evidence of that claim. No other country in the world puts on a show like ours. Everybody in the industry—from managing director to office boy—is intensely proud of it."

After paying a well-deserved tribute to the director and staff of the S.B.A.C., Mr. Burroughes went on to say that one of the greatest enemies of our achievements was the fluctuation in armament programmes and policies. Recalling Mr. Churchill's statement that it was "wasteful in the highest degree to spend many months retooling factories for rearmament and moving labour for that purpose, and then, while the weapons are still good and current, to break them up and disperse the labour," he said that rapid changes of policy not only affected the industry as it was now and the people already in it; they affected the new generation of young men with brains, whom we badly needed to recruit. "What is wanted more than anything," continued Mr. Burroughes, "is a stable programme so that the industry may work with efficiency."

Turning to the more cheerful matter of earning revenue through exports, the speaker said that the important steps already taken in the civil field had shown how ill-founded were the views of a small minority who saw no hope for British merchant aircraft against the formidable competition of our American friends. The more our industry expanded through exports the less would be the effect of fluctuations in the home defence programme, the more stable and efficient we should be, and the bigger would be our reserve of productive capacity against emergency.

But merchant aircraft had something else to contribute as well—a direct addition to our strategic strength through air mobility, the power to transport men and materials rapidly to any part of the world that may be threatened.

"May I quote the Prime Minister again," continued Mr. Burroughes, "when he said that: 'It is more by conventional armaments—mainly, in fact, by the infantry soldier serving in so many parts of the world—that we have to make our current contribution towards security.' He made no specific reference to air mobility, but if such a contribution is to be effective in terms of timing, then air transport is fundamentally essential.

"The lead given by the Government in July," said Mr. Burroughes, "will have the effect of releasing more capacity for exports and merchant aircraft. It compels us to envisage a re-distribution of effort. If air *force* means combat aircraft, air *power* means combat aircraft plus transport plus a reserve of productive capacity; and it is towards this broader conception of air power that we are now invited to move."

These sentiments brought Mr. Burroughes to the name of the guest of honour, a name with which his toast was coupled—that of Viscount Alexander of Tunis, the Minister of Defence. "In that high office" said the speaker," he has a direct concern with all the many types of aircraft and air weapons needed by the three services. To each of these services air transport is also vital, so that other attribute of air power —air mobility—is also within his province."

The Minister's Response

Replying, Viscount Alexander said that as Minister of Defence he had a special interest in the aircraft industry as one that was vital to our defence. But it was, of course a great deal more: it was a major economic asset, on which our civil aviation depended and which already made a most valuable contribution to the export trade.

As one example of what can be achieved by British military aircraft, Viscount Alexander made special mention of "the remarkable feat performed by the Canberra bomber which one day last week flew across the Atlantic and back again in about eight hours' flying time."

Referring to mobility, the Minister said he would like to mention the important future which he felt sure lay before the helicopter. It had already proved its worth from the military point of view in the operations in both Korea and Malaya. He had been in Korea a few months ago, and toured a great deal of the front line in helicopters. He could not have seen much by other means of transport.

A brief reference to the acceleration of development and research on guided weapons —"which calls for the highest skill in leadership and the best brains in British industry"— brought Viscount Alexander to the question of the simplification of aircraft design. Recalling a reference by Mr. Burroughes to "components of a variety almost too great for the comfort of our designers and customers," he assured his audience that the Government were fully alive to the dangers involved in excessive complication in the design of aircraft.

A closely connected point concerned the complaints, often heard, to the effect that it took far too long for a new aircraft to reach the stage of production. "It is undoubtedly true that it now takes longer," said the Minister, "but this is really the inevitable result of the increased complexity required to give aircraft the necessary performance so that they can fulfil their role. The true standard of comparison is not with the time it took in the past for a very different type of aircraft. The real question we want to ask is: 'Do we take longer than our competitors in other countries?' I am told that the answer to this question is in general 'No'; but this is no excuse for not doing our utmost to reduce to the minimum the period before quantity production starts."

Turning to the effect of the readjusted rearmament programme on the aircraft industry, the Minister of Defence made this important statement on policy: "As you know, we are conducting a very careful study of our defence programme in order to satisfy ourselves that it is in fact the one best suited to modern requirements and contains nothing which is not absolutely essential. We have been devoting a great deal of thought to the most realistic re-assessment we can make of the general military and national scene and of strategic needs in the light of the great progress which is being made in the development of new weapons. In addition we recognize that in order to maintain a sound economy . . . we must devote as high a proportion as is practicable of our resources to the development of our industrial strength, and in particular to exports.

"The re-shaping of our air programme will be based on the principle of concentrating more on quality than on mere numbers—on the quickest possible build-up of new aircraft and weapons of the latest type in those classes which constitute the most formidable deterrent to aggression and which, if war should come, would contribute most effectively to our own defence and that of our Allies and to a defeat of any enemy.

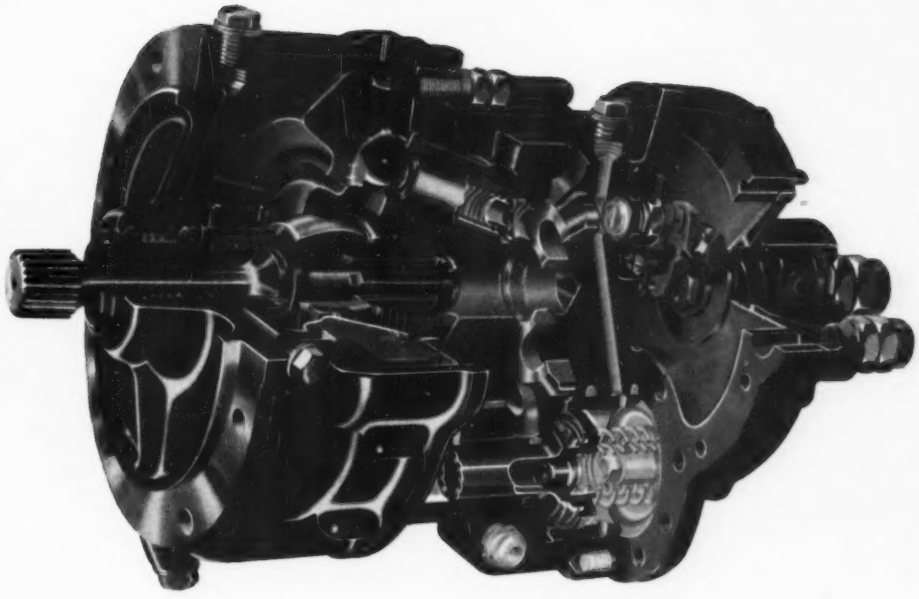
"This is bound to affect your industry and has indeed already had some effect. There will be some decreases in the requirements of certain types of aircraft and you will be asked to use your utmost endeavours to advance the date when the latest types, of which you have designed the best in the world, will come into service. The programme will still absorb a high proportion both of expenditure on defence production and of the capacity of the industry, even though the total number of aircraft required over the whole period of rearmament will be less than was at one time contemplated.

"At the same time there are likely to be improved prospects of supplying military aircraft to our Allies and other friendly powers, thus helping the country's balance of payments. There are also great and growing opportunities for exports on the civil side. It is not the wish or intention of the Government that the total size of the industry should be reduced, or its normal development retarded, because of the modification of the military aircraft programme. On the contrary, we hope to see it built up, over a period of years, into one of our major sources of national wealth and influence. We are anxious that civil exports should be increased and we hope that there will in future be more military aircraft to spare to meet the demands of overseas customers."

Viscount Alexander went on to say that the highlight of the year in civil aviation has undoubtedly been the introduction of the Comet into B.O.A.C. service; he had flown in it, and was tremendously impressed. Now we also had the Vickers Viscount, which would soon be flying for B.E.A., and within the next few years B.O.A.C. would have the Bristol Britannia. These three would place the civil side of the industry in a very strong competitive position, and this attractive picture was completed by the launching and successful flights of the Princess flying-boat, the heaviest aircraft ever built this side of the Atlantic.

"But," continued Viscount Alexander, "there is no ground for complacency. Although it is generally conceded that we lead the world in the design of jet engines, we must not forget that the Russians have had a 6,000 lb-thrust engine actually in service in Korea for at least twelve months, and no doubt they have engines of much greater power now under development or even in production. Our friends and rivals the Americans have had power-boosting devices in actual squadron service for some time. Also, they have engines of great power coming along, at least one of which is in production."

The Minister concluded: "Four hundred years ago this country was on the threshold of the first Elizabethan Age and was laying the foundations of the ship-building industry which has for so long contributed to and made possible the economic health and strength of this country. Now, at the beginning of the second Elizabethan Age, we have every reason to think that the British aircraft industry will make a comparable contribution in the future."



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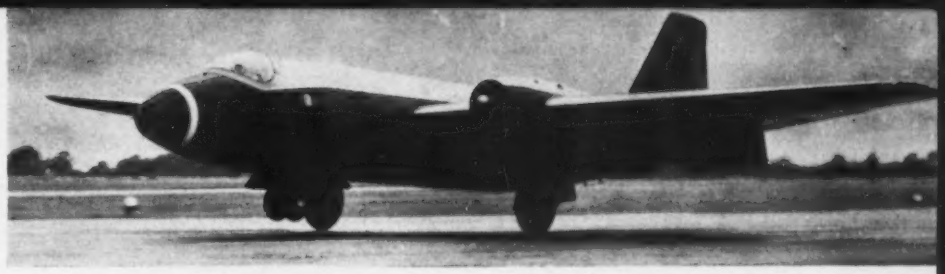


The Canberra lands at Aldergrove. (Below) Welcomed by A. Cdre. Proud, Senior Air Force Officer, Northern Ireland, and G/C. Coote, are the crew: S/L. Watson, W/C. Beamont, F/L. Hillwood.

THE CANBERRA'S DOUBLE RECORD

More About an Historic Achievement: Impressions at Aldergrove

FOR the second year in succession, an English Electric Canberra has made pre-Farnborough history by crossing the Atlantic in record time. On Tuesday, August 26th, as we briefly recorded last week, a double crossing was made on the same day—for the first time by any aircraft—and, in addition, a new west-east one-way record (subject to confirmation) was obtained.

That the Canberra now almost certainly holds all three records for the Atlantic crossing—easterly, westerly, and two-way trip—is a deserved tribute to the technical ability of the English Electric Company and the skill of its test-flying staff. The crew who took part in the record-breaking flight were W/C. R. P. Beamont, D.S.O., D.F.C. (captain), F/L. P. Hillwood, D.F.C. (second pilot), and S/L. D. A. Watson, D.F.C. (navigator). The flight was made between Aldergrove, Northern Ireland, and a line (between two boats on a lake) 14 miles west of Gander Airport, Newfoundland, a distance of 2,072.79 statute miles (3,335.669 km).

The following eye-witness account of events at Aldergrove is from a correspondent there.

There was little at Aldergrove R.A.F. station on the Monday night (writes this observer) to indicate that two new world records of outstanding importance were to be set up on the following day. The airfield, with its complement of Shackletons and Hastings, was quiet, and the only thing out of the ordinary was the slim shape of the Canberra B.5 standing outside one of the hangars, with one or two checks being made on it.

The same atmosphere of peaceful routine pervaded during W/C. Beamont's informal statement at 6 p.m. He indicated that although the weather was far from ideal for the venture, with head-winds on the westerly flight of up to 80 m.p.h., the long-range forecast showed even less favourable conditions; nevertheless, he had decided to go the next morning after 6 a.m. and not later than 9 a.m. The aircraft, he said, was in excellent trim, and had been flown to Iceland and back on a routine check during the day.

Those destined to witness the take-off rose at 4.30 a.m. and drove in complete darkness to the airfield, where the silence was broken only by the sudden opening up of the Canberra's two Avons. The latest met. forecast indicated winds up to 100 m.p.h.

The morning struck very cold, and there was a heavy layer of condensation on the windscreen of the Canberra. The machine—the B.5 prototype (VX185) first shown at the S.B.A.C. show last year, and being exhibited statically again this time—had flown from Warton, Lancs, on the previous afternoon. The nose was blacked over except for the optically flat bomb-aiming panel and a broad white line encircling the fuselage just aft of the nose cap. No drop tanks were carried, and considerable increase in the internal fuel capacity had apparently been made, the then open bomb doors revealing a bay filled by a large tank.

Just before 6.30, the crew, after shaking hands with the A.O.C. Maintenance Command, Air Marshal Sir Thomas Warne-Browne, and G/C. D. I. Coote, the station commander, climbed aboard and the engines were started up.

The Canberra taxied round to the end of the runway and, as the sun rose like a red globe behind it, took off, circled, flew low over the control tower for the benefit of the R.Ae.C. observers, and then climbed steeply until it was lost to sight in the haze.

The morning wore on, but the expected reports from the weather ships did not materialize and the rumour—later refuted—went round that the aircraft radio was unserviceable. First indication of the Canberra's safe arrival came soon after 11.15, when a message received from Prestwick stated that it had been sighted over Gander at 11.12. More waiting, with a front steadily moving up and grey clouds beginning to shed their rain, and then a further message—that the aircraft, after two hours for refuelling and the crew's lunch, had left Gander at 1.10 B.S.T.

At Aldergrove the time passed all too slowly, and, with the forecast of 100 m.p.h. winds, prophecies on times and speeds came thick and fast. Finally, an E.T.A. of between 4.30 and 4.45 was confidently mentioned.

At 4.20, in ten-tenths cloud and steady rain, people began to walk across the tarmac, and others down to the runway. The minutes ticked by, until at 4.35 a faint sound was heard in the distance and less than a minute later a jet passed overhead, lost in the gloom; it turned, and down from the cloud came the Canberra, trailing smoke, to flash across the runway at under 300ft; it had made the flight at an average speed of 605.52 m.p.h.

Immediately afterwards, with flaps and wheels down, the aircraft turned in to approach the runway, and landed, light, in an amazingly short space. F/L. Hillwood had done the homeward piloting; W/C. Beamont was at the controls on the way out.

All had gone well; navigation in the capable hands of S/L. Watson had been excellent, and the scheduled times had been meticulously adhered to. On landing, both at Gander and back at Aldergrove, there was an ample reserve of fuel in the tanks. No snags were encountered, beyond a very minor electrical adjustment, completed in 15 minutes at Gander.

The flights were accomplished at 40,000ft, and in both directions the cloud blanket prevented the crew from seeing the sea.

* * *

The official times and speeds for the flight, as given by the R.Ae.C. and subject to F.A.I. confirmation, are as follows :—

Aldergrove-Gander.—4 hr 33 min 17.05 sec; speed 454.89 m.p.h. (732.0861 km/hr)

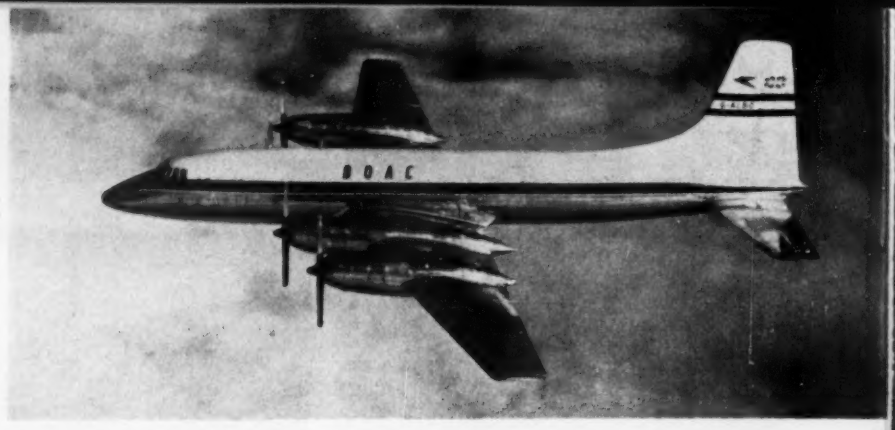
Gander-Aldergrove.—3 hr 25 min 18.13 sec; speed 605.52 m.p.h. (974.5028 km/hr)

Aldergrove-Gander-Aldergrove.—10 hr 3 min 29.28 sec; speed 411.99 m.p.h. (663.0377 km/hr)

The record for the flight from Aldergrove to Gander, set up by W/C. Beamont and S/L. Watson in a Canberra on August 31st, 1951, still stands—at 4 hr 18 min 24.4 sec (483.91 m.p.h. or 778.7791 km/hr).

Among the numerous congratulatory messages to the crew was one from Her Majesty the Queen. Addressed from Balmoral to W/C. Beamont, it read: "The Queen warmly congratulates you and your crew on your remarkable achievement today in twice flying the Atlantic in the Canberra jet bomber."

The message from Viscount Brookeborough, the Prime Minister of Northern Ireland, characterized the flight as "a magnificent achievement which adds another brilliant chapter to the history of aeronautics and emphasizes again the peerless quality of British craftsmanship." From Sir Miles Thomas came this message: "As contemporaries in jet operations, B.O.A.C. send you warmest congratulations on magnificent achievement. Will soon be after you with Comet."



LOGGING TIME: When this photograph was taken last week the Britannia had made seven test flights, totalling well over 10 hr in the air, since its 30-minute first flight on August 16th—proof enough of progress remarkably free from snags.

CIVIL AVIATION

DOLLARS FOR COMETS?

"IT was all I expected—plus," said Capt. Eddie Rickenbacker last Saturday afternoon of the Comet II prototype in which, a few hours earlier, he had flown at 41,000ft. The president of Eastern Air Lines is not the first American visitor to have complimented de Havilland on their matchless jet airliner—but he is the first to have spoken plainly in terms of dollars and deliveries. Even though several ifs and buts must be resolved before Capt. Rickenbacker reaches a decision (probably within 90 days—one way or the other), it is good to know that this American operator at least is thinking very seriously of buying Comets. For this reason alone we welcomed the opportunity to meet Capt. Rickenbacker and to hear his refreshingly frank account of the reasons behind his visit and the outcome of his discussions with the de Havilland and other companies.

Eastern Air Lines, he said, were now re-equipping with $110 m. worth of aeroplanes. They had 60 Martin 4-O-4s on order, of which 35 had been delivered; 14 of their 30 Super Constellations had been delivered, and the remainder (compounded versions) would be in service next year, when the present Super Constellations would be converted to L1049Cs. It might seem strange to consider duplicating this expenditure in the near future, but they had to look ahead. Obsolescence was the greatest hazard faced by any airline. Capt. Rickenbacker was thinking in terms of four years' depreciation rather than six, seven or eight.

He thought that the American manufacturers were unlikely to have a production jet airliner ready before 1960. Douglas, whose DC-8 seemed likely to materialize first, had given 1958 as the date, but Capt. Rickenbacker seemed unconvinced. Lockheed's plans had been put back by the Korean war and they were not likely to do any better. Boeing, he suggested, might develop the B-47 airframe into a jet transport, but his experience showed that a converted military machine could not be as effective as one conceived, designed and built as a commercial unit.

Therefore he had been glad to accept the S.B.A.C.'s invitation to Britain, where the Comet represented a three-to-four year lead in jet transports. Capt. Rickenbacker's first day here had been spent at Hatfield, where he went over the Mk I and Mk II Comets and had been shown the specification of the Mk III. The Mk I, from the Eastern Air Lines point of view, was not economic. Neither (he had concluded after his visit to Hatfield) was the Mk II; its capacity was too small and its cost per mile was too high. Eastern were geared up for aircraft with 60-88 seats and he felt it would be psychologically and economically bad to go back to 44 seats. The Mk III, with a capacity for up to 75, was more in keeping with their philosophy. They would investigate the possibility of fitting the Mk III into the E.A.L. system as an economic unit. If results were favourable and the delivery dates were acceptable, Eastern would order Comet IIIs. It would take at least 35 to do the job they had in mind.

Capt. Rickenbacker envisaged a "top echelon" of Comets operating high-speed de luxe services. Super Constellations would then be relegated to second place and the Constellation 749s and DC-4s converted for high-density coach travel. He had suggested —and de Havilland had promised to consider the proposal seriously—that a Comet II be sent to the U.S.A., to be operated experimentally for two or three weeks on the New York/San Juan Puerto Rico route. The manufacturers would have to bear only a third of the cost.

Regarding delivery dates, Capt. Rickenbacker said that de Havilland had promised to give him as firm an indication as possible before he left for America during the S.B.A.C. Show. The makers were analysing the question, and, he added, "their enthusiasm is developing." He would want Comet IIIs by the end of 1955 or early 1956, although he admitted that mid-1957 would still be 2½-3 years ahead—"which is a big thing in the airline business." The proposed order for Comet IIIs, Capt. Rickenbacker estimated, would, with spares and other associated expenditure, run into $100 m. The Comet III order would be preceded by one for three or four Comet IIs—for crew training, proving and operational research. If E.A.L. bought Comets, other American operators would follow suit.

The de Havilland Aircraft Company have made no direct comment on Capt. Rickenbacker's statement, other than to confirm that delivery prospects are being reviewed. They point out, however, that it has been inferred that the company cannot produce Comets in large numbers. "This is not true. Dependent on orders being placed immediately, the company could produce 50 Series II Comets, in addition to those for which orders have already been placed [49 Mk Is and Mk IIs], for delivery by the end of 1955." It might be asked why de Havilland make no reference to possible delivery-dates of Comet IIIs: the answer is simply that this larger version is still in the design stage, whereas Comet II production could be expanded immediately.

THE HERMES DITCHING

FOLLOWING the accident to the Hermes IV which, on August 25, was "ditched" in the Mediterranean off Trapani, Sicily, the Ministry of Civil Aviation made a statement on the possibility—suggested in some quarters—that the type might be grounded. It said: "Previous accidents have been carefully considered, but the circumstances have not been thought to justify taking the extreme step of grounding the aircraft. Evidence is now being sought in Sicily as to the circumstances of the accident to that Hermes. On receipt, this evidence will be considered with the previous evidence."

The Hermes was flying on a Sudan Government "leave service" charter-operated by Airwork, Ltd., and on board were 51 passengers—Government officials and their families returning to the Sudan—and six crew-members. They had taken off from Blackbushe at 8.15 p.m. on the Sunday. Subject to any further information that may emerge from subsequent inquiry, it appears that first one and then the other inboard engine became unserviceable when the aircraft was within an hour's flight of Malta shortly before dawn. The pilot, Capt. G. S. F. Winsland, warned his passengers that ditching was inevitable, and within ten minutes skilfully put the aircraft down on fairly calm water. R/T. and visual distress signals had been made, and help was soon forthcoming for the passengers in rafts and life-jackets. The aircraft itself stayed afloat for about ten minutes.

Of the passengers, a man, a woman and three children lost their lives, while the stewardess, Miss A. T. French, was also missing. That the death-roll was not larger was, according to many of the survivors, due to the captain's skill and to the fact the Hermes was fitted with rearward-facing seats.

CHARTER NOTES

DURING the seven days ended August 31st, the British independent air-transport operators equalled the good traffic returns of the previous week. Apart from trooping flights, they again flew 82,000 miles, 56,000 of which were on freight work and 26,000 on passenger flights. Altogether 99 flights were reported as having been completed, while approximately 1,000 passengers and 350 tons of freight were actually carried during this period.

Approximately 40 per cent of last week's charter business was made up of long-distance flights to the Far and Middle East; some 30 per cent of the mileage was flown on the Berlin-Hamburg ferry; and the remaining 30 per cent involved passenger and shorter freight flights. The aircraft in greatest use during this last week of August were Yorks, with 29,000 miles to their credit; next came Silver City's Bristol 170s with about 20,000 miles; Dakotas with 19,000 miles; and, finally, a Tudor and a Viking with 11,000 and 3,000 miles respectively. Estimated flying time was 465 hours and the probable resultant revenue, £35,000.

Skyways of London, Eagle and Crewsair again had most of their aircraft tied up on trooping work and were able to undertake only a small amount of commercial flying. A Crewsair Viking flew to Kano with two tons of cardboard cartons and a Skyways York returned from Tokyo with a load of freight. Eagle Aviation completed their penultimate batch of week-end student-flights by carrying two loads of 46 passengers each way between Copenhagen and Paris. Scottish Airlines Dakotas made two trips to the Middle East; one was a return flight to Cyprus for the N.A.A.F.I., with 24 passengers in each direction, and the other involved the transportation of 5,350 lb of freight to Dhukan for the Iraq Petroleum Company.

B.K.S. Aero Charter Dakotas were again busy with student flights, completing five return trips to Basle, each with 32 passengers each way. The Dakota which last week flew a ship's component from Gibraltar to Amsterdam waited for the part to be repaired and then flew it back to Gibraltar.

Air Charter's Tudor, returning from its insecticide trip to Tokyo, picked up a load of freight at Hong Kong and flew it to Bombay. Here the aircraft embarked a ship's crew and flew them to Milan. Three of the company's Yorks completed 35 round trips between Berlin and Hamburg, some of which were passenger flights. Silver City's two Bristols, on the same run, made 21 round trips. Bristol 170s also flew 24 polo ponies from Deauville to Lympne and two loads of cheese from Le Touquet to Lympne. Two cars and ten passengers were flown from Brest to Blackbushe. During last week-end Silver City moved 60 members of the New York City Ballet Company, 3,500 lb of baggage and 15,000 lb of props and equipment from Edinburgh to Berlin in four flights, two routed *via* Hamburg and two *via* Berlin.

Air Transport (Charter) (C.I.) Ltd. made return flights with 32 passengers each way to Salzburg, Munich and Basle.

At a time when charter business normally slackens off potential business is available in plenty, and it seems likely the present week will prove to have been a particularly busy one.

T.C.A. SUPER CONSTELLATIONS

AN order for three more Super Constellations is announced by Trans-Canada Air Lines, who had previously decided to buy five for service on Atlantic and Caribbean routes. The company expects to take delivery of all eight aircraft by mid-1954, enabling it to offer 150 per cent. more passenger-capacity on the North Atlantic route and 37 per cent. more on domestic services (to which North Stars used at present on the Transatlantic route will be assigned). Super Constellations will be used by T.C.A. to carry up to 89 passengers non-stop from Montreal to London.

APPRAISAL: Capt. Eddie Rickenbacker (right), president and general manager of Eastern Air Lines, flew for an hour in the prototype Viscount 700 from London Airport on August 27th. Behind him in the cockpit is seen Mr. George Edwards, designer of the Viscount and Valiant; Mr. Jock Bryce, Vickers' chief test pilot, is in the captain's seat. The veteran American airman declared himself greatly impressed by the Viscount.

THE STARS LOOK UP: Pictured over Hollywood is the prototype Lockheed Super Constellation, a design which has attracted airline orders to a total value of well over $250m. Details of the latest order appear below.

WAYFARERS IN SPAIN

OPERATING a fleet of six Bristol 170s, the Spanish airline Aviacion y Comercio made a net profit of some 5m pesetas (nearly £170,000 at the official basic rate of exchange) during 1951. The aircraft flew 7,400 hr and nearly 1,110,000 miles (increases of, respectively, 20.5 per cent. and 18.7 per cent. over the 1950 figures) on the company's domestic routes and overseas services to France, the Canary Islands and West Africa. The average load factor for the year was 74 per cent. and the number of passengers carried—123,127, was 51 per cent. more than in the previous year. The company's fleet is to be augmented by two more Bristol 170s (the latest Mk 31Es) and two Languedoc 161s.

MORE ABOUT BACKWARD-FACING SEATS

"A SUBSTANTIAL proportion of the people who have been killed in civil aircraft crashes need not have died had the aircraft and their fittings been designed for 'crashworthiness'." This compelling statement introduces an important new summary of information on rearward-facing seats compiled by Mr. R. R. Shaw of the Australian Department of Civil Aviation. Australia, it will be remembered, is following the lead set by the American M.A.T.S. and R.A.F. Transport Command in sponsoring the adoption of this type of seat in passenger-carrying aircraft. Mr. Shaw's notes set out the reasons behind the proposal that 12g rearward-facing seats should be built into all future aircraft.

Discussing the usual arguments against the installation of these seats, the author remarks that psychological objections are not believed to be more than talking-points used by those who really oppose the new seats on other grounds—and he quotes the results of American and R.A.F. polls showing that, in fact, passengers prefer to face aft. He believes that, economically, there should be no special difficulty about installing backward-facing seats, and that the weight penalty should not be much more than 5 lb per passenger. He notes that there are wide variations in the weights of forward-facing seats used at present—variations justified presumably on aesthetic or comfort grounds—and concludes that the economic effects of a few pounds extra are not catastrophic. It would be unrealistic, he admits, to dismiss lightly the objection that the cost of new transport aircraft would be increased and their delivery dates put back by enforcement of the new standard of seating which his department hopes to introduce.

In an appendix the author refers to two accidents which, he claims, "quite dramatically illustrate some of the points made." The crashes in question are those of a Tudor V at Llandow, Wales in 1950, and of an R.A.F. Valetta near Stockholm in 1951. In the first case, the aircraft apparently stalled from 300 to 400 ft, struck the ground at over 100 m.p.h. and stopped in its own length; of 83 people aboard the Tudor there were only three survivors. The Valetta crashed in bad visibility during an overshoot. Estimated impact speed was 100 kt and the aircraft stopped in less than its own length; of 22 people aboard only the second pilot was killed and 14 were completely uninjured. The mean deceleration in both cases was approximately 10g. Mr. Shaw points out that the Tudor's passengers were in 6g forward-facing seats, whereas those in the Valetta used 20g backward-facing seats, and concludes that it is not extravagant to claim that none of the passengers in the aft area of the Tudor would have been killed had the aircraft been fitted with suitable seats and fittings. He feels that a substantial improvement in the survival rate can be achieved by steps which involve a relatively small economic penalty, and that "there is strong moral obligation to take these steps."

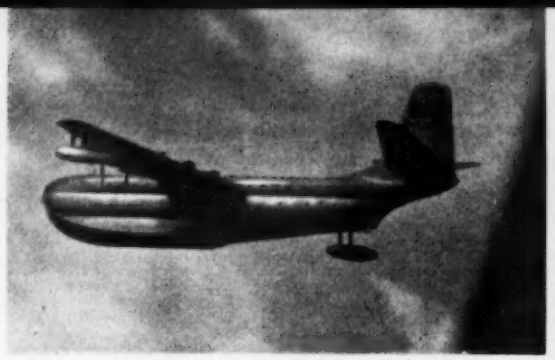
CIVIL AVIATION . . .

THRIFTY TWIN

A PROJECT likely to attract the interest of short-haul operators in many parts of the world is the Twin Pioneer, details of which have just been released by the manufacturers, Scottish Aviation, Ltd. As its name implies, the aircraft will be a development of the single-engined Prestwick Pioneer which, as the makers justifiably claim, "has so fully demonstrated the exceptional take-off and landing performances obtained by the use of high-lift devices." Powered by two 550 h.p. Alvis Leonides, the Twin Pioneer will be capable of lifting up to 16 passengers from strips of just over 100 yd. Stage-lengths vary up to 500 miles, and in this respect the Twin Pioneer might be thought to overlap the obvious sphere of application for the large helicopters now under development. Scottish Aviation feel, however, that these helicopters would be too large to operate economically on the low-density routes (such as the Scottish Islands services) for which their machine is intended.

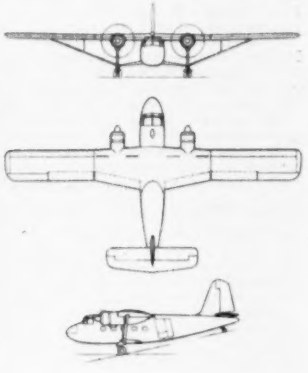
To reduce maintenance costs, and to increase the ability to operate from small, unprepared airfields, the Twin Pioneer will be of particularly sturdy all-metal construction with fixed tail-wheel undercarriage. Hydraulic power will be used to operate the disc-type wheel-brakes, flaps and slats. The aircraft is designed for operation by a pilot only, but provision will be made for a radio officer or other crew member. There will be seats for 16 passengers and baggage or 14 with toilet compartment; the seat attachment fittings will permit a rearward-facing layout if required and will also make suitable tie-down points when the aircraft is used as a freighter. The operating cost will be in the region of 2¾d. per passenger-mile, allowing for U.K. petrol tax; the price of the Twin Pioneer has been provisionally estimated at £30,000.

Estimated speeds of the Twin Pioneer are 185 m.p.h. (maximum at 2,000ft) and 170 m.p.h. (weak-mixture cruising, at 11,750ft). At a maximum take-off weight of 12,500 lb, engine-off stalling speeds are estimated as 73 m.p.h. (flaps up), 56 m.p.h. (flaps at 20 deg), and 53.5 m.p.h. (flaps at 30 deg). Operating at this weight, the Twin Pioneer will be able to clear a 50-ft obstacle in 320 yd. Dimensions are: Length, 45ft 11in; span 76ft 6in; tail-down height, 13ft 8in; wing area, 657 sq ft.



THE MIGHTY PRINCESS is glimpsed during the 32-minute maiden flight on August 22nd. Sir Miles Thomas, B.O.A.C. chairman, took the picture from a Dove, in which he witnessed the first take-off of the 140-ton Saunders-Roe "flying-ship."

SIMPLICITY AND ECONOMY, coupled with the ability to operate from 100-yd airstrips, will be the key features of Scottish Aviation's Twin Pioneer. Two 550-h.p. Leonides radials are the intended power units of this 14/16-seat transport; further details of the project appear above.



BREVITIES

THE total number of miles flown by Comets reached 1½ million during the regular London-Johannesburg service which left London on Sunday, August 24th. This figure includes training and development flying.

* * *

During the first six months of 1952, Swissair carried nearly 137,000 passengers, an increase of 13 per cent on the total for the same period of last year. The total distance flown by the airline was nearly 3,000,000 miles.

* * *

United Airlines announces the sale of the routes and equipment (including a fleet of seven DC-3s) of its Mexican subsidiary Lineas Aereas Mexicanas, S.A., to a new Mexican company known as Lineas Asocideas Mexicanas, S.A. Some 2,500 miles of routes, centred on Mexico City, and 500 employees are involved in the transfer.

* * *

An operating cost of 1.27 pence per ton-mile was quoted for the Viscount in the review of British aircraft published last week; such a rate is, of course, impossible even for the Viscount, and the phrase should have read "per passenger-mile."

* * *

From September 1st, the signals QDM and QDR have been reinstated in the Aeronautical Section of the "Q" Code, with the same significations as QUX and QUV in the General Code (which are no longer used by M.C.A. radio stations in the United Kingdom). *Information Circular No.* 79/1952 instructs pilots and radio officers to use QDM and QDR on all appropriate occasions.

B.E.A. carried 32,800 more passengers in July than in the corresponding period last year—an increase of nearly 23 per cent. Total number of passengers during the month was 177,100, of whom 83,700 travelled on international routes.

* * *

Airways (India) Ltd., who now operate 17 Dakotas and two Doves, made a profit of £90,000 during the year ended December 31st, 1951. During this period the company's aircraft flew 27,483 hours and covered some 4,300,000 miles, carrying 111,472 passengers.

* * *

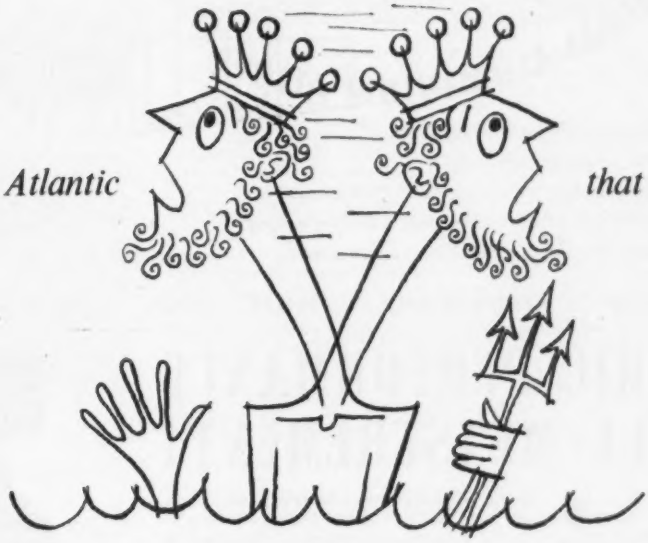
The total value of inter-line traffic transactions submitted to I.A.T.A. for accounting and settlement during the first six months of this year was $100,435,000 (over £35m)—an increase of over 33 per cent over the amount cleared during the corresponding period in 1951. This was the first occasion in the five-year history of the I.A.T.A. Clearing House in London on which transactions for six months exceeded $100m. The turnover for June alone was over $18m, 36 per cent more than the total for June, 1951.

* * *

Sabena, who have ordered two DC-6A Liftmasters for delivery in 1954, report that their freight aircraft last year carried 57 per cent more exports and 35 per cent more imports to and from Brussels than in 1950. An interesting sidelight on international freight operations is the finding of a Sabena survey that the company's main cargoes were, in order of importance: textiles; jewellery, precious stones and ore; machine-tools; furs; and pharmaceutical products.

CANBERRA!

That's the Atlantic



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SERVICE AVIATION

Royal Air Force and Naval Aviation News

BACK IN LONDON last week were four of the R.A.F. officers of No. 230 Squadron, who have been assisting the British North Greenland Expedition (see account overleaf). Left to right: F/Lt. C. M. Stavert, S. Bowater, D.F.C., R. C. Menzies and A. Yates.

Colour for R.A.F. Regiment

THE Queen has been graciously pleased to approve the award of a Queen's Colour to the R.A.F. Regiment.

The Colour will be of silk in Royal Air Force blue, with Her Majesty's Royal Cypher in the centre, the Union in the canton and the badge of the Royal Air Force Regiment in the fourth quarter. It will be 3ft 9in square, with a blue and white fringe and blue and white tassels, and will be carried on a staff 8ft 6in long, surmounted by a crown.

The Queen's Colour which is to be presented to the R.A.F. Regiment.

This will be the fourth royal colour to be awarded to the Royal Air Force. The first was presented by King George VI to the Royal Air Force College, Cranwell, in 1948, the second was presented to the Royal Air Force in the United Kingdom by the Queen (then H.R.H. Princess Elizabeth) on behalf of her father in May, 1951, and the third was presented by Her Majesty to No. 1 School of Technical Training—the Aircraft Apprentices' School—at R.A.F. Station, Halton, Bucks, on July 25th.

Canberras' Overseas Exercise

LAST week six Canberras left St. Eval, Cornwall, to take part in an exercise at Gibraltar.

Directed by A. Cdre C. E. Chilton and Brigadier H. G. Wainwright, the exercise was designed to test the anti-aircraft defences of the Rock and to give the public some experience of air attack under modern conditions. The Canberras made low-, medium- and high-level attacks.

Ford's Air Day

FOR an unique prize—"a fine case of Edwardian Stuffed Birds, fitted with an inscribed plaque executed in Nimonic 75"—three naval captains, are to compete against three commanders in an air relay race at the Air Day at R.N.A.S. Ford, Sussex, tomorrow, September 6th. The rival teams are: *Captains*—Capt. J. C. Cockburn (C.O., Ford), Capt. P. D. Gick (Admiralty) and Capt. F. H. E. Hopkins (Admiralty); *Commanders*—Cdr. D. B. Law (Ford), Cdr. F. Stovin-Bradford (Culdrose) and Cdr. B. H. C. Nation (Admiralty). In each team there will be an Attacker, a Meteor and a Sea Vampire.

No. 890 Squadron (Attackers) led by Lt. Cdr. R. W. Kearsley, will give a display of individual and formation flying and three R.N.V.R. Squadrons—Nos. 1840 (Ford), 1832 (Culham) and 1833 (Bramcote)—will take part in a final fly-past.

Battle of Britain Fly-past

FORMATIONS totalling 213 aircraft are expected to take part in this year's Battle of Britain fly-past on Monday, September 15th. As in previous years the lone Hawker Hurricane will be in the lead, and last of all will come the Hawker Hunter.

No fewer than 187 of the aircraft will be jet-propelled, including 120 Meteors, six Attackers, 48 Sabres, 12 Canberras and one Valiant.

The Hurricane and Hunter will both fly at 1,000ft, the former at 184 m.p.h. and the latter at an unspecified speed. All the remaining jets are scheduled to fly at heights between 1,500 and 2,000ft at 364 m.p.h. The Hurricane is due to pass over Whitehall at 1230 hr precisely but in the event of bad weather the fly-past may be postponed until 1700 hr or until the same time the next day.

The Battle of Britain "At Home" will take place the following week-end—on Saturday, September 20th. There will be 76 R.A.F. stations open to the public, compared with 65 last year. Binbrook, Lincolnshire, where Canberra-equipped squadrons are stationed is one of the Bomber Command airfields to be opened, and a new feature this year will be the opening of North Luffenham, Rutland, where the Royal Canadian Air Force will have its Sabres on show.

In 1951 approximately 378,000 people visited the 65 open stations and over £10,000 was raised and shared between the R.A.F. Benevolent Fund and the Royal Air Forces Association.

MANCHESTER IN MALTA: Pilots of No. 613 (City of Manchester) Squadron, R.Aux. A.F., chatting with naval pilots during the squadron's recent visit to Malta. Left to right: Cdr. J. T. Morgan, R.N., F/O. P. Kirkpatrick, F/O. P. Durnford, S/L. J. B. Wales. (Commanding Officer No. 613 Squadron) and Lt. Cdr. C. V. S. Malleson. S/L. Wales is a test pilot at Avros.

SERVICE AVIATION . . .

ARCTIC AIRLIFT

ON this page we publish the official account of the "Arctic airlift" by five Sunderlands of No. 230 Squadron, sent to aid the British North Greenland Expedition. Written by F/L. R. C. Menzies, the intelligence officer to the party, it is almost entirely factual; no mention is made of particular difficulties such as that caused by the intense clarity of the atmosphere which, coupled with the barrenness of the surrounding land, made everything appear very close, and heights impossible to gauge accurately. Cdr. Simpson's own account of the capsized dinghy incident throws greater emphasis on F/L. Stavert's skilful handling of the Sunderland. The leader of the expedition came very near to losing his life. On August 5th, A.V.-M. T. C. Traill, A.O.C. No. 19 Group, Coastal Command, accompanied by G/C. J. D. Miller, Station Commander at Pembroke Dock, flew up to Young Sound in a Sunderland of No. 201 Squadron. To celebrate their visit, seal steaks and liver were served. It is reported that some liked them . . .

AN official operation order was received stating that five Sunderland aircraft of No. 230 Squadron would proceed via Reykjavik (Iceland) to Young Sound, latitude 74 deg north, and would act in support of the British North Greenland Expedition by transporting 150 tons of stores, dogs and passengers to Britannia Lake, latitude 77 deg north. In that simple order was bound up many days of back-breaking toil, hazardous flying, and unusual operating conditions. The detachment, consisting of 40 aircrew and 20 ground staff, was placed under the command of S/L. J. S. Higgins, D.F.C., A.F.C., O.C. No. 230 Squadron.

The first aircraft, commanded by S/L. Higgins, left Pembroke Dock on July 21st, landing at Reykjavik that afternoon. Several attempts were then made to carry out a reconnaissance of the ice en route to Young Sound, with a view to aiding the m.v. *Tottan*, which was conveying the expedition party and stores to Young Sound. Because of treacherous weather this was not done until July 28th and, although the aircraft actually reached latitude 74 deg north, it was then flying at 8,000ft just above severe icing cloud and had to return to Reykjavik.

On July 30th a signal was received from the *Tottan* at Young Sound, that the landing area there was clear of ice and the weather fine. Therefore, aircraft "Y," which had proceeded to Reykjavik on the 28th, took off under command of S/L. Higgins and landed at 1715 hr G.M.T., and the R.A.F. ensign flew over Young Sound for the first time. Aircraft "O," which had developed slight engine trouble, arrived at 2015 hr.

During the succeeding days much hard work was devoted to preparing the tented encampment ready to receive the remainder of the R.A.F. party. The sun shone continuously throughout the 24 hours, aiding the work which generally continued from 6 a.m. till 11 p.m. On August 3rd S/L. Higgins set out for Britannia Lake in aircraft "O," to be followed later by "Y." On arrival over the lake, to everyone's dismay, it was found to be almost completely frozen over and impossible to alight upon. There was no alternative but to return to Young Sound. Cdr. (L) C. J. W. Simpson, D.S.C., R.N., leader of the B.N.G.E., considered it was quite likely there would be a big change in seven days and so work proceeded on preparing aircraft loads.

On August 5th S/L. Higgins, flying an unladen aircraft, "P", took off on a flight to test the approach to the lake. He and his companions were delightedly surprised to find the lake now almost completely free of ice and thereupon he decided to land. He alighted at 1015 hr and so the first aircraft ever to land on Britannia Lake (nameless until its survey by Cdr. Simpson in 1951) did so without mishap. The lake is five miles long and about two miles wide at its maximum, and is located between two large glaciers at its eastern and western ends. These are now known as the Lion and Unicorn glaciers respectively. It is flanked by 3,000ft hills on its northern shore, and some slightly smaller hills on its southern shore.

The next problem was to find a suitable anchorage and even at a point less than 50 yd from the shore no bottom could be found. Ultimately a rubber dinghy was put out and S/L. Higgins, Cdr. Simpson, F/L. Yates and F/L. C. M. Stavert (Deputy O.C.), rowed to the shore. After carrying the dinghy some distance overland they came to a sandy moraine with a shelving bottom and the spot was selected as a camp site and anchorage.

It was intended to commence the airlift next morning, but a thick fog blew into Young Sound from the sea, and by 2200 hr visibility was down to 200 yd.

The fog continued all next day, and it was not until August 7th that "O" was taken off by S/L. Higgins at 0925 hr, and another piece of history was written when the first aircraft ever to land on Britannia Lake and disembark passengers and freight touched down at 1110 hr. Cdr. Simpson and his advance party rowed ashore in one of the expedition's small wooden dinghies —specially designed for transportation in the Sunderland. "Y" landed at 1335 hr and both aircraft were unloaded, using rubber dinghies and the two expedition dinghies ("Y" brought in the second one). The Saunders-Roe pontoon, used for servicing at Pembroke Dock, was unloaded in parts and an R.A.F. party under F/L. W. T. Morrison, A.F.C., was left to assemble it and lay aircraft moorings.

From that day on the airlift proceeded. On the 8th, Britannia Lake revealed a new aspect. F/L. Stavert landing at 0925 hr, found a 35-40 kt wind whistling down Unicorn glacier, sweeping the water into a white-topped fury with 4ft high waves. Unloading was impossible.

Arrangements had been made for an airborne lifeboat to be dropped by a St. Eval Lancaster, operating from Reykjavik, and this was done at 1317 hr. Unfortunately it was severely damaged on impact and the bows were smashed in. Cdr. Simpson decided to attempt salvage and, accompanied by Lt. Erskine of the B.N.G.E. and Sgt. Shelton-Smith, R.A.F., proceeded to the scene in the outboard dinghy. This overturned in the sea and the luckless three swam 20 yd in the icy water to the waterlogged lifeboat. F/L. Stavert, who had prudently started up his aircraft and slipped moorings, by skilful manœuvring in rough seas came alongside and a rope was flung out to the three in the lifeboat. Fearing damage to the aircraft, Cdr. Simpson gave the order to jump. Sgt. Shelton-Smith was hauled on board at once, Lt. Erskine was hauled round the aircraft, but the gallant Commander was swept away. Once more F/L. Stavert went to the rescue and as the Commander swept by the forward door of the aircraft Sgt. Shelton-Smith, regardless of his own soaked condition, caught him by the hair and hauled him to safety. All were at work again in three hours. F/L. Stavert actually got the upturned dinghy in tow, but it had to be released again because of danger to the aircraft.

The next day the Saunders-Roe pontoon was in use, and this enabled larger loads be taken from the aircraft; but, now that both the outboard dinghy and the airborne lifeboat had been lost, the pontoon had to be hauled ashore on a line—cruel work in the prevailing wind. From then on aircraft were flown in at the rate of four, and on occasion five, per day.

The next exciting phase started on August 13th when an outer engine on aircraft "V" failed 20 minutes after leaving the lake, and it completed the path across the 7,000-feet high ice-capped mountains on three engines. Examination revealed the necessity for a new engine, and it then became necessary to exchange the serviceable inner engine with the failed outer engine. Having done the equivalent of two engine changes, the aircraft was then to be taken off and flown on three engines by her captain, F/O. E. W. Beer, to Reykjavik.

Work commenced at 1515 hr on the 14th and was completed by 0430 hr on the 15th. Before it was complete, however, a sudden violent northerly gale, gusting up to 60 kt, swept through the camp and broke "V" and the m.v. *Tottan* away from their moorings across the three-miles-wide Sound. Nevertheless, the servicing party carried on with the work of completing the engine change, rather than lose the engines. S/L. Higgins and a party of officers set out in the motor boat to attempt to tow "V" back, but in the meantime "V" had entered a different airstream and was now proceeding stern first up the Sound. Finally, with the aid of lifeboats from the *Tottan*, the rearward progress of "V" was arrested 70 yards from the shore; she was brought back to moorings at 0830 hr.

From then on the weather became much colder. Snow fell at the lake and fog formed at the Sound, and on three occasions aircraft were forced back, air temperatures being about minus 10 deg C. On the night of the 17th ice commenced to enter the Sound in large quantities and on the 19th a very large section, about two miles broad, drifted in and passed around the aircraft.

Nevertheless, the lift was completed on the 19th by flying eight sorties, each aircraft doing two. On the 20th a second aircraft was flown away to Reykjavik ("V" having left on three engines on the 18th) and on the 21st the last trip was done. This was to drop supplies on the ice cap for an advance party, and also at Seal Lake —20 miles west of Britannia Lake. These were parachute drops and some were not quite successful, due to the difficulty in carrying out the task from a Sunderland aircraft.

The last three aircraft left Young Sound for Reykjavik under extremely hazardous conditions, surrounded by ice—large and small—and fog giving varying visibility distances of a thousand to 600 yards. All aircraft first taxied along to find an ice-free path, then set a compass course and took off into the fog, skimming past ice floes only dimly seen. All landed at Reykjavik between 5 p.m. and 7 p.m.

Next day, Saturday 23rd, all aircraft returned to Pembroke Dock.

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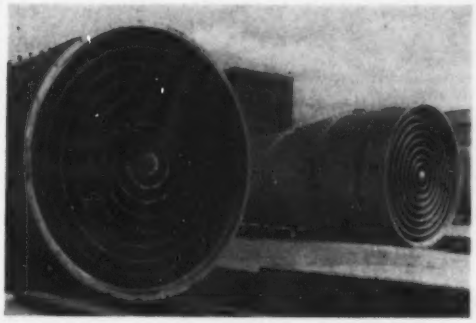
DOUSING the DECIBELS

A Practical Solution of Gas-turbine Test-bed Silencing Problems



This close-up of the discharge outlets of two Mk V Detuners affords an idea of the size of such equipment.

WELL known in connection with engine test-house development is the name of Horace W. Cullum and Co. The firm are acoustic engineers and, over a period of 25 years, have developed complete installations for the testing of all kinds of reciprocating engines, particularly aircraft engines.

With the advent of the gas turbine, new problems presented themselves. Turbojet testing involves much greater air velocities and also produces a considerable increase in the noise intensity at both high and low frequencies. Again, "free exit" conditions have to be maintained at the engine jet nozzle. To meet these and other requirements, the device known as the Detuner was evolved about ten years ago, and a Cullum offshoot, Detuners, Ltd., of Flowers Mews, London, N.19, has now been formed. Before describing a Detuner, a brief history of the company's development work may appropriately be given.

Detuners have been developed over a period of about ten years. The early types were quite capable of silencing engines such as the Ghost and the Nene, at least to a degree to which exception could not be taken during normal working hours. But larger engines were reaching the running stage four or five years ago, and considerable effort was directed to the development of a Detuner of sufficient capacity for, for example, the Avon and Sapphire. Initially, none of the avenues of research appeared to be leading towards improved efficiency, and the law of diminishing returns was much in evidence. Eventually, a new layout was adopted in the Cullum Detuner Mk V, and this unit has proved capable of silencing the larger engines sufficiently for night running to be carried out.

As its name implies, a Detuner breaks down the noise spectrum of the engine efflux into (usually) three bands; low, 10 to 150 cyc/sec; middle, 150 to 1,000 cyc/sec; and high, 1,000 to 10,000 cyc/sec; and each band is blotted out by a separate absorbent section of the Detuner. The general layout, shown in the drawing below, is typical of the later types of installation.

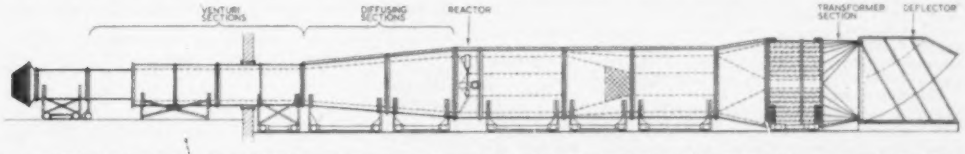
The strongest parts of the installation are the mixing tube and diffuser. Mixing of the jet with the induced cooling airflow is so good that there is virtually no temperature-gradient across the flow at the reactor. This is particularly beneficial, for the allowable reactor temperature determines the cooling-air entrainment ratio, which in turn governs the size of the Detuner. Even in the absorbent sections, the flow temperature at the walls is low enough for the use of heat-resistant alloys and ceramics to be rendered quite unnecessary. The main structure is in mild steel. Stainless steel was once employed, but local heating has now been eliminated, thus removing unequal stresses. The walls are generally formed from three layers of thin mild-steel plate, flexible connections between sections and across the triple wall preventing transmission of noise and permitting considerable expansion with changes in temperature. Each section is carried on a track-mounted trolley.

The actual muffling is effected by absorbent sections each approximately 10ft in length, of which up to 12 can be employed in series, although ten is a more usual number. The silencing materials and construction cannot be detailed, but it is worthy of note that they differ according to the frequency band in which they are used. Some sections of the Detuner employ perforated linings over the inner walls, while others cause the gases to pass through perforated cones. It has been found that, in operation, some Detuner sections create additional noise in the frequency range dealt with by downstream sections.

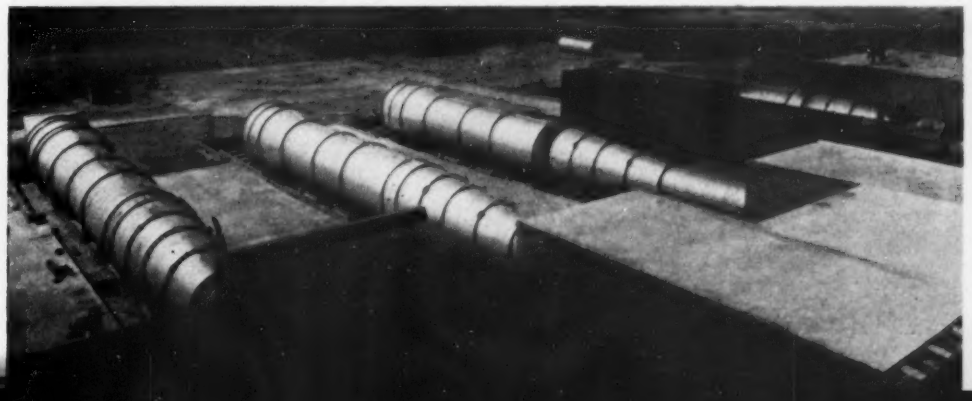
The operation of the turbojet under test is greatly affected by the large disc valve known as the reactor. Adjustment of the reactor, which can be effected manually while the engine is running, varies exhaust pressure and temperature, and can reproduce free discharge conditions at all r.p.m.; even when the reactor is fully closed, there is still sufficient airflow for the engine to be run safely. Once the correct setting is obtained, the reactor is locked and need be changed only in exceptional circumstances. A direct periscope may be inserted into the Detuner to enable the engine tail-pipe or turbine blades to be seen through a hole in the centre of the reactor.

The airflow is divided into a number of concentric layers before release to atmosphere, and the upper photograph shows the internal tubing to good effect. To the open end of the Detuner is connected a short length of plain tube which changes the section to permit the attachment of a square-section deflector to produce an upward flow at the outlet.

The chief types of Detuner at present in production consist of



The simplified drawing above is included to show the proportions and layout of a typical Detuner; the flow is from left to right, the entrained cooling-air entering through the mesh guard. Below are a number of Detuners recently erected at the works of a well-known turbojet manufacturer.



DOUSING THE DECIBELS . . .

the Mk V, which is suitable for engines of between 5,000 and 12,000 lb thrust without afterburning; the Small Mk V capable of handling engines of between 5,000 lb and 7,000 lb thrust; and the new Cullum Mk VI Detuner, capable of accommodating the largest turbojets with afterburning. Also available are Detuners Mk IV and Mk XIV, which are "straight-through" designs for use where mass flow and silencing requirements are less stringent.

In all these patterns, the necessity for water injection into the entrained air is obviated by the efficient flow-mixing and careful design of the component parts. Throughout the development of present-day Detuners the guiding principle has been the maintenance of high operating temperatures without excessive local heating. This has been accomplished by keeping the temperature at the optimum value and by permitting expansion where necessary; thus mild steel may be used throughout.

Detuners have been supplied to many foreign countries, as well as to the major British engine firms. Detuners, Ltd., emphasize that development of their equipment has been made possible only by the co-operation shown by firms such as Rolls-Royce and de Havillands, who have permitted a great deal of development work to be carried out on their existing test-beds.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

R.A.F. Jet Accidents

THE attention of the public in recent months has been drawn by the daily Press to the frequent crashes of jet aircraft. Commonsense reasoning suggests that this is because speeds are greater than in other operational types and because jets are used in larger numbers. Invariably, the crashes have been attributed to pilot and not to structural failure.

It is fairly well known that high-frequency sound-vibrations are used in experimental physics to kill small animals. Might not two powerful jet engines provide a source of vibrations, not to kill, but to impair the judgment and speed of reaction of a pilot as surely and as unnoticeably as the lack of oxygen at altitude?

London, S.E.18. E. V. WALLACE.

Heathrow Memories

THE article by B. J. Hurren in *Flight* of August 15th, regarding Heathrow, revived many memories. One in particular concerned the exceptional grass surface to which your contributor referred, and many of your readers will know that this was achieved by the efforts of a Mr. Hunter, whose talents in this direction were recognized by the use of the word "hunterisation" applied to his many successful attempts at making excellent aerodrome surfaces.

I well remember my small part in the making of Heathrow, as at that time (1930) Heston was developing under the enthusiastic direction of Messrs. Norman, Muntz and Dawbarn, and I was employed in the small engine-shop under an ex-R.A.E. engine specialist, one Harry Cross. In between our small output of Gipsy Is and Cirrus IIs and IIIs, Cross engaged in several "spare-time" jobs such as making engine stands and the old petrol tower, every piece of angle iron in which was cut and drilled by hand.

Mr. Hunter required some heavy rollers for Heathrow so, sure enough, Harry Cross and his engine-shop got the job and proceeded to cut and bend some very heavy channel steel, about eight or nine inches in section, to serve as roller frames for the heavy water-rollers Mr. Hunter planned to use. We must have dragged our small bench all round the old concrete hangar getting those bends, with Harry Cross wielding his blow-pipe and some of the hangar staff commenting pointedly on "aircraft engineering." However, the rollers were made and were trundled away behind Mr. Hunter's large black and red Mercedes to Heathrow, where they played their part in the "hunterisation" of the Great West Aerodrome.

Chertsey, Surrey. W. J. TEBBY.

MAY I, in memory of a man who did a great deal for civil and Service aviation in his day, recall that the Fairey Company's Great West Aerodrome was laid out, long before the days of concrete runways, by C. P. Hunter, the hereditary head of James Hunter, Ltd., of Chester, probably the greatest authority on, and the greatest purveyor of, grass-seed in this, or any other, country.

Claude Hunter was an enthusiast in everything he did, and a first-class sportsman. In the early days of civil aviation he bought himself a Klemm monoplane and used to fly it all over the country. From supplying grass-seed and good advice for aerodromes he took to supplying the aerodromes themselves. Which meant that he contracted to level and drain the land and then supply the grass best suited to the earth which composed it.

His test of whether the surface was level and smooth enough was whether he could drive his big Mercedes sports car along and across it in any direction at 50 m.p.h., without being jounced or bounced. He made the Great West Aerodrome so perfect that he had to go back and "roughen" the SW. corner of it, so that the Fairey Company, who at about that time had more aircraft in the R.A.F. than had all other makers together, could bump their wheels on it hard enough to test their undercarts.

He laid out the Portsmouth Aerodrome, among others. I remember the fun he had blowing up the "impregnable" forts along the north and north-east side of the peninsula which, unlike those at Singapore, had been built on the supposition that Napoleon's army might land farther east (in spite of the Martello towers) and march west and south to attack Portsmouth. The Government of A.D. 1800 or so reckoned that the Navy could defend their own port, but that the Army must be equipped to defend the landward approach. A pity that nobody thought that way fifty years before the Japanese cast evil eyes on Singapore. Probably the Japanese knew all about Portsmouth. We aviation people talked and wrote enough about the Napoleonic forts while Claude Hunter was blowing them up. But how his ghost must loathe these miles of concrete that desecrate and disfigure his lovely lawns.

Coombe Hill, Surrey. C. G. GREY.

Forecasters' Responsibility

IN a monthly journal devoted to meteorology a controversy rages about the old problem of the "amicable state of war" existing between pilot and forecaster.

It was raised by a pilot of Aer Lingus who stated that in marginal conditions a forecast covering a distant airport was frequently one that provided for all contingencies, i.e., "wide open, occasionally clamped," leaving the pilot to make decisions.

He suggested the appointment of a company forecaster who, in such cases, bearing in mind the operational minima and with his knowledge of the route and airport concerned, should either authorize or divert the flight.

The current issue of the journal has letters from two leading aviation forecasters who quite obviously resent the implication that they cover themselves against all contingencies at such times.

It is my contention that the situation would seldom arise if the forecasters themselves had flying experience of their particular routes and were conversant with local conditions at distant airports. Such knowledge would enable them to be far more positive on days of marginal conditions and thus relieve the pilot of the necessity of making his own forecast.

The final paragraph of the original letter concluded: "These matters affect the safety of an aircraft, to say nothing of the 'interested party,' the pilot, who is of necessity always at the scene of the accident."

Keston, Kent. J. BODEM.

FORTHCOMING EVENTS

Aug. 31-Sept. 7. Scandinavian Air Rally.
Sept. 1-7. S.B.A.C.: Flying Display and Exhibition, Farnborough.
Sept. 5. Helicopter Association: Lecture ("Helicopter Operating Experiences", by A. V. J. Verniquwe) and Annual Dinner.
Sept. 6. R.N. Air Station, Ford: At Home Day.
Sept. 7. "Yorkshire Evening News" Motor Festival, Sherburn-in-Elmet.
Sept. 13. Royal Air Forces Association: Display, Stansted Airport, Essex.
Sept. 13. Southern Aero Club: Rally, Shoreham.
Sept. 14. Milan Aero Club: Milan Grand Prix.
Sept. 15. Battle of Britain Day.
Sept. 15. I.A.T.A.: Eighth Annual General Meeting, Geneva.
Sept. 17. Aircraft Recognition Society: Opening 1952-3 Meeting and Contests.
Sept. 17. Golf: R.N. and W.R.N.S. v R.A.F. and W.R.A.F., Camberley.
Sept. 20. R.A.F. At Home Day.
Sept. 20. British Interplanetary Society: Report by British Delegation on Stuttgart Congress.
Sept. 21. S.M.A.E.: Models Contests, Butlin's Holiday Camps.
Sept. 24-25. Aerodrome Owners' Association: Annual Conference, London.
Sept. 28. Aéro-Club de France: Coupe Stemm Helicopter Competition.
Nov. 8. British Interplanetary Society: "Evolution of Life in the Universe," by Prof. J. D. Bernal, F.R.S.

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RE-USABLE COCOONS

An Economical Form of Preservative Packaging

THE general technique of "Cocooning" equipment, in order to preserve it during long periods of storage, is fairly widely known. It was described in *Flight* of August 7th, 1947, and again in our issue of August 3rd, 1951. The process was introduced to this country five years ago by R. A. Brand and Co., Ltd., of Field House, Breams Buildings, London, E.C.4, but it may not be generally appreciated that the term "Cocoon" is used by them as a trade-mark.

The technique has been very widely adopted, particularly by the Services, and has more than proved its worth. It can, for example, conserve valuable hangar space by permitting delicate equipment to be stored out of doors, even in the most rigorous climates. But one characteristic of this method has tended to restrict the extent to which Cocooning has been adopted, namely, that each coating could only be used once.

In the past, when a Cocooned item has been required for service, the skin has been stripped off—still in perfect condition—and thrown away. R. A. Brand have now developed a re-usable skin which can be sprayed over an article for storage (or over a pattern of the same shape), taken off again and folded up, and then wrapped over a similar article—not once, but many times.

Known as Texicoon, the new process is certain to find many applications which were denied its expendable predecessor. It is, for example, already popular with B.O.A.C. and its use may, with advantage, be described in connection with the storage of the de Havilland Ghost turbojets used by the Corporation's Comet Unit.

The engine is slung from its three upper mounting lugs at a convenient height above the floor, with the underside free from mountings or obstructions. A pre-fabricated harness is then placed around the underside of the engine, consisting of a transverse loop of plastic-impregnated cotton fabric located at its ends by light steel caps which fit the Ghost's main mounting trunnions. In the centre of this strip, at the lowest point of the engine, is a third steel pressing which projects downwards to be located in a hole in the engine mounting cradle in which the Ghost is shipped.

An outsize zipp-fastener is then placed along the top of the engine; it is held firmly in a strip of fabric about 18in broad. The location of this zipper is hindered by the presence of the slinging cables, but it is passed between them without much trouble and located on the engine in the correct position. The engine is then padded with felt sheet and greaseproof paper to form a smooth, fairly uniform shape.

The Texicoon is then applied by a continuous spraying process, and dries almost immediately. Two coats are given, the solution being similar to other Cocooning fluids made by R. A. Brand and Co.; and during their application a humidity-indicating panel is "sprayed in" to the skin, a desiccant container being trapped within the Cocoon. The zipper is completely covered by the Texicoon and forms a hermetic seal. The finished skin may be given a final coat of aluminium-impregnated plastic, and it then weighs no more than ¼ lb/sq ft; therefore 100 sq ft, enough to cover a Ghost power unit, weighs but 25 lb complete.

Texicoon is assisting B.O.A.C. in positioning a number of de Havilland Ghost turbojets at strategic points on their routes. In the upper photograph, a Texicoon is being replaced over a Ghost which has been first covered with felt and greaseproof paper.

If the skin is pushed in, it yields and returns to its original contour; excessive strain will burst the surface, but a repair may be effected in about 60 seconds by painting-in a patch from the kit carried on the engine-mounting stand.

The Ghosts are normally shipped mounted on stands within crates; but the crates are by no means essential, especially if transport is to be by air. At their destination—perhaps on the route to Johannesburg or Colombo—the engines may safely be left out of their crates and should require no attention other than an occasional look at the humidity panel. Brands are very proud of the fact that they have received no complaints regarding the performance of Texicoons, or of their expendable Cocooning films.

When an engine is wanted, the Texicoon over the slide fastener is cut open with a knife and "unzipped" to reveal the Ghost inside. The Texicoon may then be rolled up and stowed away until it is again needed. It may then be re-positioned over another engine—easier this time, the metal locating caps now being part of the skin—and zipped up by hand, the zipper being finally sealed by brushing on a little Cocooning fluid. All the materials required for effecting a repair, or re-sealing, are contained within a tin 4in by 4in by 2ft which accompanies each Texicooned engine.

AN ESTER-RESISTANT FINISH

ESTER synthetic lubricants, now coming into increasing aeronautical use for gas-turbine duties in particular, offer some outstanding advantages in comparison with hydrocarbon oils, chief among which is their ability to maintain optimum viscosity over an exceptionally wide temperature-range. In certain circumstances, however, their employment may raise minor problems by virtue of the fact that they also happen to act as efficient paint-removers. With this fact in mind, Modern Industrial Finishes, Ltd. (Thames Chemical Works, Lower Road, Northfleet, Gravesend, Kent), have developed an aircraft finish which is claimed to be the only nitrocellulose coating giving resistance to the effect of such lubricants. It is known as the "Sorco" scheme, the letters of the name standing for "Synthetic-Oil Resistant Coating."

Sorco materials are stated to be quick-drying and suitable for both external and internal application on airframes and components where the finish is likely to be exposed to the effects of the lubricants.

Drying and application characteristics conform closely to the standard painting schemes D.T.D. 772 and 63B. It is, therefore, possible to use Sorco without any alteration to existing painting procedure and, in addition, one process replaces the two previously used. Since it is a nitrocellulose material, the finish can be applied over surfaces already painted in D.T.D. 772 and 63B, thus giving protection against esters, though not to the same degree as the complete scheme.

The makers state that surfaces treated with Sorco materials will, after 24 hours' drying, withstand complete immersion in ester lubricant D. Eng. R.D. 2487—R.D. E/O/463 for 24 hours without damage. With each succeeding 24-hour drying period the unaffected immersion is correspondingly increased by seven days. If a long enough drying period is available, therefore, the resistance of the finish can be extended to several weeks of complete immersion.

The scheme consists of the use of a primer surfacer and a finish which may be polished if desired. The primer dries sufficiently hard in four hours for the application of the finishing coat, and the primer alone will resist ester lubricants, thus making it possible to test-fly the aircraft before final painting.

THE INDUSTRY

MEMENTO: This impressive crystal and silver trophy, commissioned by The English Electric Co., Ltd., in consultation with the Worshipful Company of Goldsmiths, to commemorate the Canberra's transatlantic record flight last year, is on show at the Retail Jewellers' Association Exhibition now being held in Sydney, Australia. The designer of the trophy was Mr. Reginald H. Hill. The latest Canberra achievement lends particular topicality to the exhibit.

Production Down-Under

NEXT January the first Australian-built Canberra is scheduled to be delivered to the R.A.A.F. This is most heartening and indicates that production plans at the Government Aircraft Factory have progressed very well; the Canberras will be a modified Mk 2 type and 48 are at present due to be built. Shortly after the first Canberra delivery is to come the first Avon-Sabre. This fighter, which looks like being a winner, is basically the F-86E with a Rolls-Royce Avon of a late mark and an armament of four 20 mm guns. The airframes are to be entirely Australian-built, although American components will be incorporated in the first few aircraft; the first batch of aircraft will also fly with a British-built Avon, until the Commonwealth-built Avons begin to appear.

The Avon production-rate in Australia is scheduled to reach 12 engines per month. In Sydney, the Bankstown plant of D.H Australia has already delivered 56 of the 80 Nene-powered Vampires on order, and some of these aircraft are now with the R.A.A.F. in the Middle East. They will be followed by 29 Vampire T.11 trainers, presumably to be powered by Goblins.

Peradin Amalgamation

AN amalgamation has recently taken place between the Peradin Division of P. B. Cow and Co., Ltd., located at Freshford, Somerset, and the Watercraft Co. (Bristol), Ltd. The new company thus formed will be known as Peradin and Watercraft, Ltd., and will continue to operate at Freshford, near Bath, as a wholly owned subsidiary of the P. B. Cow Group.

Very completely equipped, the works will provide additional manufacturing facilities for "Peratol," a widely known aircraft-cabin sealant and synthetic protective coating for metal. It will also produce mechanical and rubber mouldings for the aircraft and engineering trades; bonded rubber-to-metal components; and inflatable and other equipment for marine applications.

Mr. F. E. J. Biles has been appointed managing director of the new company, with Dr. Warren in charge of research and Mr. A. E. G. De Vekey handling sales.

Decorative Wood Panelling

KNOWN as "Q" board, an attractive new decorative wood panelling has been developed by H. Morris and Company, Ltd., Milton Street, Glasgow, C.4. It is available with a variety of pressure-stamped repetitive designs, and may be obtained in several thicknesses and in fireproof, lightweight and flexible forms. Representative weights are: 1/16in flexible, 0.25 lb/sq ft; ⅛in "multiply," 0.85 lb/sq ft; and ¼in lightweight, 1.1 lb/sq ft. Already A.I.D.-approved for other products, the firm has applied for approval of the board for use in aircraft.

Versatile Aircraft-material

THE regular visitor to aircraft factories cannot fail to notice the widespread and still increasing use of Fibreglass. This interesting material has been steadily developed over a number of years by Fibreglass, Ltd., of St. Helens, Lancashire, and—although glass-resin reinforced plastics are also produced by other firms—it is one of the most widely used non-metallic ingredients of the modern aircraft.

Fibreglass is produced from very fine filaments of drawn glass fibre bonded with phenolic resins. It is available as thin sheet with a basic filament diameter of 0.00008in; as sheet, yarn and cloth in heavier gauges; and as rigid sections, or in the form of moulded laminates for specific purposes.

The fine sheet is an excellent insulator of both heat and noise, particularly when used as a double thickness; with a polyvinyl film on both sides the sheet weighs but 0.042 lb/sq ft and, on the Comet, 10,000 sq ft of such material (not 5,000 sq ft, as quoted in a recent announcement) are wrapped around the fuselage in two layers with a Vinyl inner coating, the resulting reduction in transmitted noise being quoted as about 20 db in the range 100/4,000 cyc/sec and up to 60 db at higher frequencies—i.e., the transmitted noise energy is, in the latter case, one-millionth of that incident upon the fuselage exterior.

Heavier material is finding many applications in the manufacture of radomes—where dielectric properties are of paramount importance—and for numerous other structures of irregular shape, among which may be mentioned shaped laminates for wing and fin tips (frequently used as aerials), de-icer panels, interior panels and storage boxes, and hot-air ducting.

As the de Havilland Comet has already been mentioned in this connection, it is of interest to examine the applications of Fibreglass in this aircraft, as listed by the makers of the material. Sound and thermal fuselage insulation is provided by a double layer of "superfine" fibre; the 14 miles of electric cable are insulated by continuous-filament yarn; the structural floor is made from staple cloth used as a resin-bonded laminate with an ozonate infill; Fibreglass laminates are used for the radomes over the aerial displays; the de-icer panels are made from flat laminates; wing and fin tips are moulded laminates; ducting is made from laminates, with sheet sewn between inner and outer layers where thermal insulation is required; and, finally, the de-humidifiers which attend the Comets in B.O.A.C. service are insulated with Fibreglass rigid sections, and also employ continuous-filament cloth to globularize the extracted vapour.

Fibreglass is stated to be fireproof, non-corrosive, non-hygroscopic (water absorption about 1 per cent) and generally inert. Not generally appreciated is the fact that its structural properties compare with those of many metallic materials, typical figures being: tensile strength, 25,000 to 40,000 lb/sq in; shear strength, 15,000 to 20,000 lb/sq in; strength in flexure, 50,000 to 60,000 lb/sq in; and Young's modulus in tension, 2 to 3×10^6 lb/sq in.

British I.R.E. Awards

THE Clerk Maxwell Premium, awarded annually for the most outstanding paper published in the *Journal of the British Institution of Radio Engineers*, has been awarded for 1951 to Mr. H. Paul Williams, Ph.D., for his paper on "Subterranean Communication by Electric Waves." Dr. Williams was formerly with A. C. Cossor, Ltd., and is now with the Fairey Aviation Company.

Among the Institution's other awards for 1951 is the first award of the Brabazon Premium to Mr. G. E. Roberts, of the Decca Navigator Co., Ltd., for his paper on "The Design and Development of the Decca Flight Log." This premium is for the most outstanding contribution to the Institution's proceedings on radio or electronic aids to aircraft safety. Mr. G. R. Beswick, of Birmetals, Ltd., receives the President's Prize for the most successful candidate in the 1951 graduateship examination, and the Marconi Premium goes to Mr. E. G. Rowe, M.Sc. (Brimar Valve Division, Standard Telephones and Cables, Ltd.) for a paper on "The Technique of Trustworthy Valves."

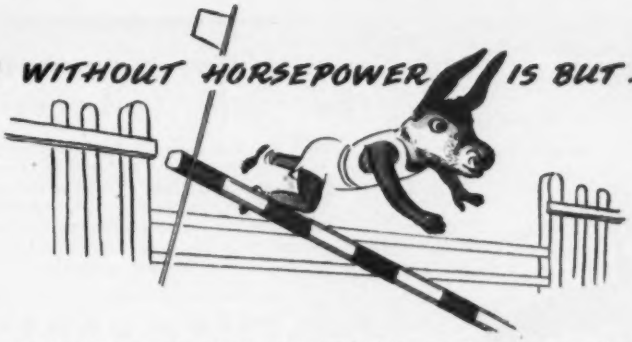
Oil Industry and U.S. Charges

FOLLOWING last week's Press reports of U.S. Government proceedings involving the oil industry, the Hon. Frank J. Hopwood, a managing director of the Shell Transport and Trading Co., Ltd., made the following statement:—

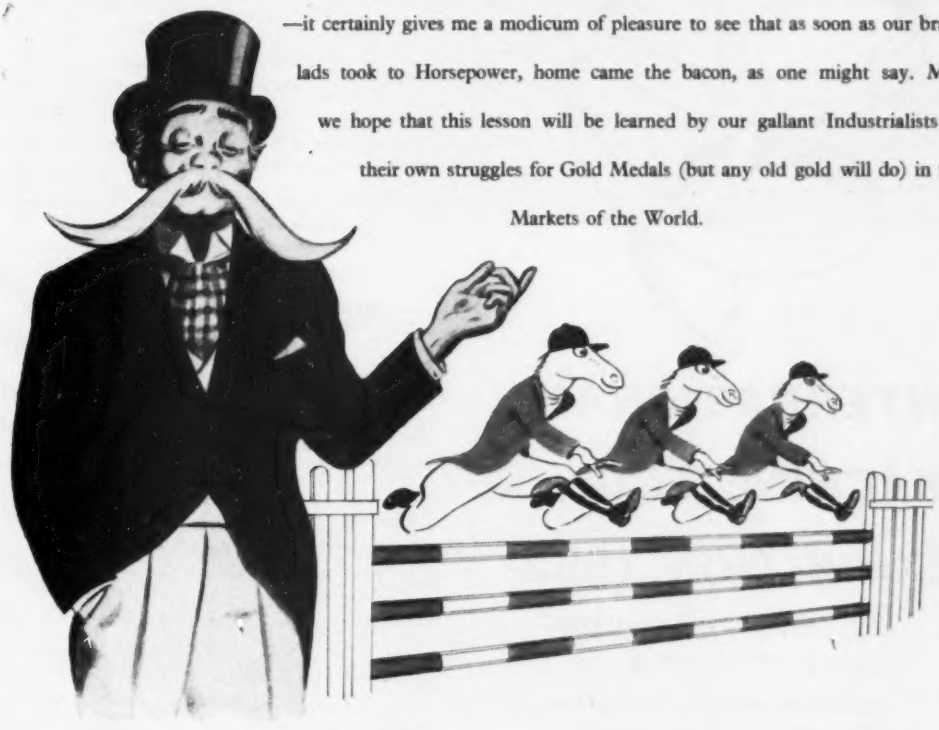
"I have seen the Press reports from the United States of the three proceedings on the part of different branches of the United States Government, involving the oil industry. The first is apparently a court action at the instance of the Mutual Security Agency with which Shell is not concerned. The second is apparently a criminal investigation before a grand jury, the proceedings of which are secret. The third appears to be a public hearing to be held by a sub-committee of the Small Business Committee of the United States Senate, before which the oil companies are invited to reply to charges said to have been made in a report published by the United States Federal Trade Commission. This public hearing before the Senate Sub-committee appears to involve the same subject-matter as the secret grand jury proceedings. Not having seen any of the official documents it is impossible for me to comment in detail.

"It is a matter of common knowledge that measures of co-operation between members of the industry have been necessary (and, indeed, sponsored by Governments) in order to ensure that the requirements of the world, both military and civil, should be met. However, I can state that there is no international oil cartel. In fact, the oil industry is keenly competitive."

MAN WITHOUT HORSEPOWER IS BUT AN ASS



Far be it from me to **gloat**—*said the M.D. in a gloating voice*—over the disappointment at the paucity of Gold Medals secured by our gallant lads and lassies at Helsinki for Running, Jumping, Twisting the Umpire, Hurling the Insult and Casting No Aspersions. **But**—*he continued, oozing self-satisfaction*—it certainly gives me a modicum of pleasure to see that as soon as our brave lads took to Horsepower, home came the bacon, as one might say. May we hope that this lesson will be learned by our gallant Industrialists in their own struggles for Gold Medals (but any old gold will do) in the Markets of the World.



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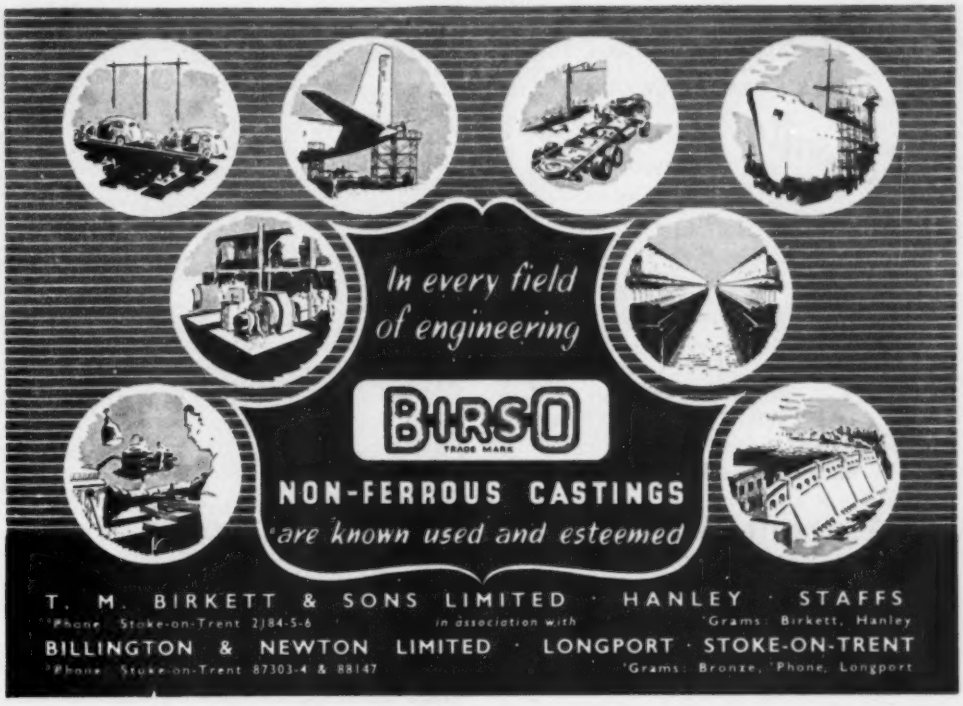
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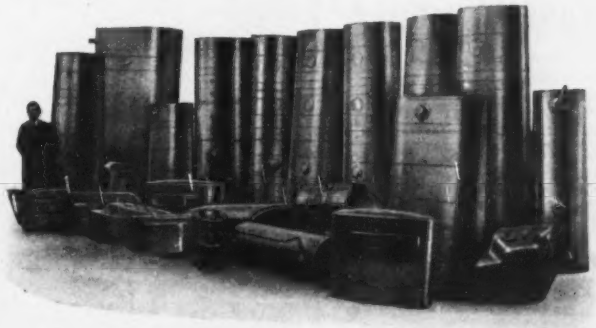

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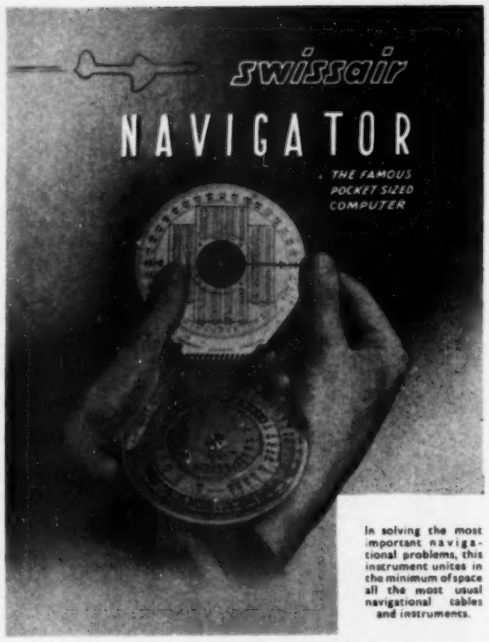
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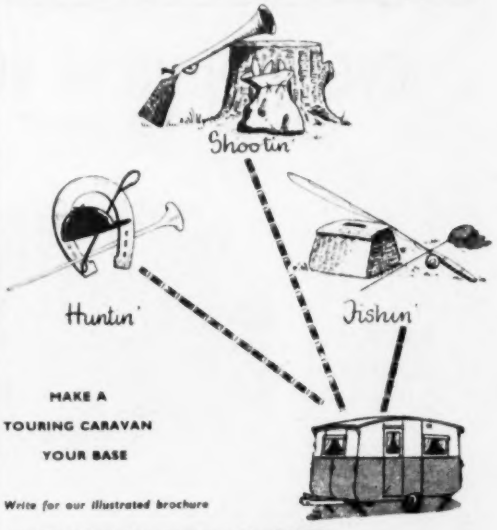

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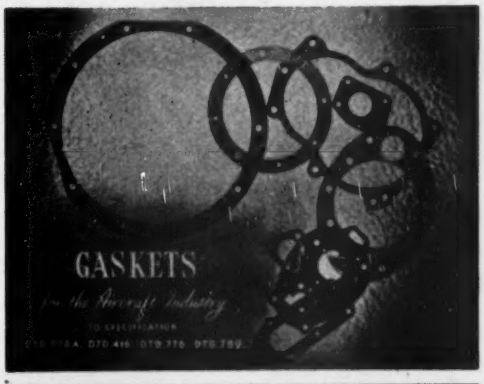

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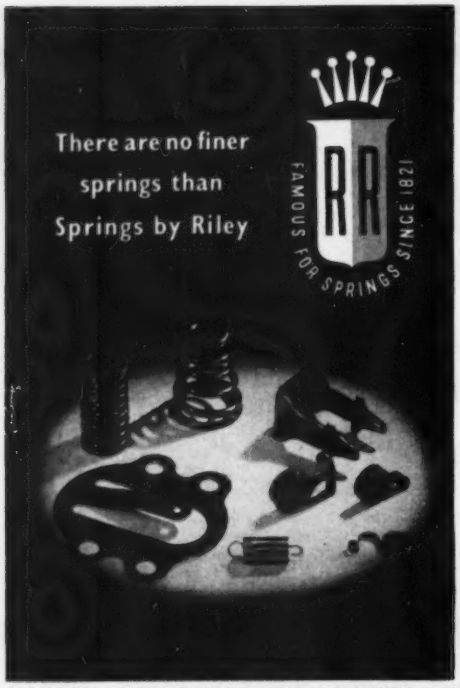

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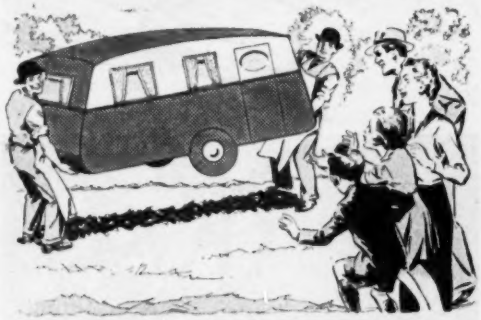

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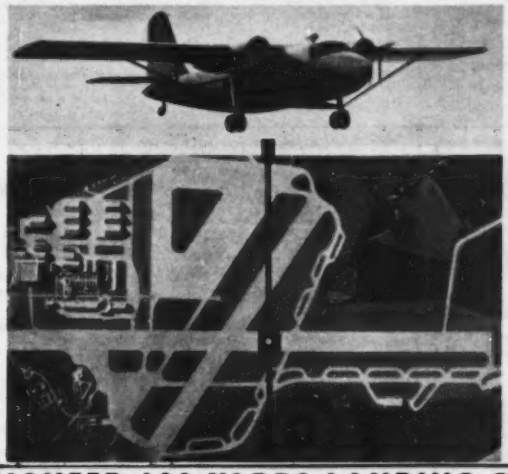

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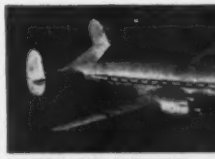
LEARN to fly at Redhill Aerodrome, Surrey. South London's nearest flying centre, 23 miles from Hyde Park Corner. £3/10/- per hour dual; from £2/10/- solo; instrument flying, instructors' and advanced courses. Attractive clubhouse with full catering facilities.—Tel.: Nutfield Ridge 2266. [0247]

HERTS and ESSEX AERO CLUB, Broxbourne Aerodrome, Nazeing, Essex. M.C.A. approved 30-hour course; solo flying from 30/- per hour; residential: trial lessons, 25/-; train from Liverpool Street, or Green Line Coach 715. Tel.: Roddesdon 2483, 2421, 2996. [0200]

BRITISH COMMONWEALTH AGENTS AND CONCESSIONAIRES FOR



BRETAGNE AIRLINER
(30-43 Passengers—1,000 miles plus)

PIAGGIO P. 136
(5-seater Amphibian)

PIAGGIO P. 148
(Fully Aerobatic Trainer and Sports Aircraft)

PALAS AUXILIARY BOOSTER UNIT

Full details on request

CONSULTANTS

WING COMMANDER R. H. STOCKEN, R.Ae.S.: Eagle House, 109 Jermyn St., London, S.W.1. Tel.: Whitehall 8888. [0619]

CANADA-UK. Britain Liaison service. Technical and Sales. Personal contact.—W. P. Dunphy, Consulting Air Engineer, Montreal Airport, Montreal, Canada. [0048A]

INSURANCE

ALL types of aircraft insurance and personal accident cover.—Apply to J. W. T. Amery, Messrs. R. J. Moffat and Co., Percy House, 796, High Rd., Tottenham, N.17. Tel.: Tottenham 2002-4-6. [0034]

PACKING AND SHIPPING

R. AND J. PARKS, Ltd., 143-9, Fenchurch St., E.C. Tel.: Mansion House 3083. Official packers and shippers to the aircraft industry. [0012]

PUBLIC ANNOUNCEMENTS

AIR TRANSPORT ADVISORY COUNCIL

THE Air Transport Advisory Council give notice that they have received the undermentioned applications to operate scheduled air services:—

APPLICATION No. 4. From East Anglian Flying Services Ltd., Southend Airport, Southend-on-Sea, Essex, for a seasonal internal service with D.H.89 aircraft for the carriage of passengers between Ipswich and Jersey with intermediate traffic stops at Southend, Rochester and Shoreham, at a frequency of Saturday two to five, and Sunday two to three services during the period from April 1st, 1953 to March 31st, 1960.

APPLICATION No. 5. From East Anglian Flying Services Ltd. of Southend Airport, Southend-on-Sea, Essex, for a seasonal normal scheduled service for the carriage of passengers between Ipswich and Ostend with intermediate traffic stops at Southend, with D.H. 89 aircraft at a frequency of one to two services daily during the period from April 1st, 1953 to March 31st, 1960.

APPLICATION No. 6. From East Anglian Flying Services Ltd, of Southend Airport, Southend-on-Sea, Essex, for a normal scheduled service for the carriage of passengers between Ipswich and Paris with intermediate traffic stops at Southend, Rochester and Shoreham, with D.H.89 aircraft at a frequency of from two services weekly to three services daily according to the season during the period from April 1st, 1953 to March 31st, 1960.

APPLICATION No. 7. From British European Airways Corporation of Ruislip, Middlesex, for a normal scheduled service with DC-3 Pionair and Viking aircraft for the carriage of passengers, supplementary freight and mail between Manchester (Ringway) and Dusseldorf (Lohausen) with intermediate traffic stop at Amsterdam (Schipol) at a frequency of three services weekly to be operated for a period of 10 years.

APPLICATION No. 8. From British European Airways Corporation of Ruislip, Middlesex, for a Colonial Coach service with DC-3 Pionair and Viking aircraft for the carriage of passengers, supplementary freight and mail between London (Northolt) and Malta (Luqa) with technical stop only at Marseilles (Marignane) at a frequency of one service weekly from October 28th, 1952, for a period of 10 years.

THESE applications will be considered by the Council under the Terms of Reference issued to them by the Minister of Civil Aviation on July 30th, 1952. Any representations or objections with regard to these applications must be made in writing stating the reasons and must reach the Council within 14 days of the date of this advertisement. Address to the Secretary, Air Transport Advisory Council, 9, Buckingham Gate, London, S.W.1, from whom further details of the applications may be obtained. [0024]

TENDERS

COUNTY BOROUGH OF WEST HARTLEPOOL

LEASE OF CIVIC AERODROME

TENDERS are invited for the lease, as from April 30th, 1953, of the Corporation's Aerodrome, which is situated at Greatham, about three miles from the centre of West Hartlepool, and is conveniently situated to serve Tees-side and Durham County.

THE Aerodrome has grass runways and is 220 acres in area; the main runways are approximately 1,400 yards, 930 yards and 930 yards in length, but the Corporation has agreed in principle to at least one of the runways being extended to 2,000 yards.

THE lease will include a blister hangar with 1,350 square yards of floor space and a maximum height of 20 feet, and other buildings (mostly wooden) suitable for administration (Club room, Caterer's offices, waiting rooms, Air Club headquarters, repair shop, living accommodation, petrol pumps, etc. Certain of these smaller buildings are sub-let and particulars thereof, together with a plan showing the aerodrome, may be obtained from me on request.

THE Aerodrome was opened in 1936 and has since the war been used for civil flying. Crash, fire, V.H.F. and D.F. wireless, perimeter lighting, and other equipment required for the purpose of the Public Use Licence is owned by the Corporation, but would be hired to the tenant.

A SUCCESSFUL Flying and Social Club is in operation at the Aerodrome; charter flights to all parts of the British Isles have been undertaken, and at the present time two charter services to Jersey and one to the Isle of Man are operated each week by Dakota aircraft.

TENDERS are invited on two alternative bases, namely:

(a) the Tenderer being responsible for the maintenance of the surface of the airfield and the buildings; or

(b) the Corporation undertaking the maintenance of the airfield surface and buildings.

TENDERERS are required to state clearly in their Tenders:

(i) the amount offered on the basis of each alternative;

(ii) the length of the Lease desired.

THE person or firm whose tender is accepted will be required to enter into a Lease embodying the terms and conditions upon which the Aerodrome will be occupied and may be required to furnish references to the satisfaction of the Corporation.

A COPY of the terms and conditions will be forwarded on request, and further particulars may, if desired, be obtained from me.

TENDERS addressed to the undersigned at the Municipal Buildings, West Hartlepool, must be forwarded in a plain sealed envelope endorsed "Civic Aerodrome," so as to be received not later than the 31st day of October, 1952.

THE Council does not bind itself to accept the highest or any tender.

ERIC J. WAGGOTT,
Town Clerk.

Town Clerk's Office,
Municipal Buildings,
West Hartlepool.
August 8th, 1952. [0015]

TIME RECORDERS

STAFF (item checking and job-costing) time recorders (all makes) for quick cash sale; exceptional condition. —Box 7291. [0016]

TUITION

ACAREER IN CIVIL AVIATION

Complete training facilities to M.C.A. application of I.C.A.O. standards, for all professional pilot/navigator qualifications on the FULL-TIME personal coaching basis or "STUDY-AS-YOU-WORK" (lessons, questions, model answers) method. Ideal those in Services or seeking higher licences:

COMMERCIAL, INSTRUMENT RATING, RADIO TELEPHONY, SENIOR COMMERCIAL, A.T.P. (ALSO CONVERSION), FLIGHT NAVIGATOR, A.R.B. TYPE RATINGS (GENERAL AND SPECIFIC). All simulated procedures with briefing for instrument flight test.

Flying instruction at best rates.
Assistance in securing employment.
Write for advice, without obligation

LONDON SCHOOL OF AIR NAVIGATION (1949), Ltd., 8/10, King Street, London, W.8. (BUY. 7600.) [0277

AVIGATION LTD.

(THE SAFE GUIDANCE AND HANDLING OF AIRCRAFT IN THE AIR)

WE regret that owing to the phenomenal successes of our Students in the M.C.A. examinations we have had to withdraw the privilege of paying the examination fees to students who obtain a complete pass at their first sitting.

THE most moderate fee are charged (no further text books required) for courses printed and illustrated in colour for all pilots and navigators' licences.

APPLY for brochure and sample lesson to Avigation, Ltd., 30 Central Chambers, Ealing, W.5. (EAL 3949). [0248

THE COLLEGE OF AERONAUTICS.

A COURSE of Lectures on "The Elements of Aerodynamics and Fluid Mechanics" will be given at the College from Monday, October 27th, to Friday, October 31st, 1952.

THIS Course is intended to provide an ordered survey of the essentials of the subject for those new to it. Laboratory work and demonstrations will play an important part.

FEES for the course are:—Tuition fee, £10 10s. 0d. Residence Charge (including full board), £6 6s. 0d.

COPIES of the Syllabus and Forms of Application can be obtained from the Registrar, The College of Aeronautics, Cranfield, Bletchley, Bucks. [0305

AIR SERVICE TRAINING offer a refresher course in preparation for commercial pilot's licence and instrument rating technical examinations.

COMMENCEMENT dates for full course: 8th September. Duration six weeks. Fee £35.

COMMENCEMENT dates for half course (Instrument Rating only) 29th September. Duration three weeks. Fee £16/10.

FOR full particulars apply to the Commandant, Air Service Training Ltd., Hamble, Hants. [0008

LEARN to fly for £36 instructors' licences and instrument flying for £6 an hour; night flying £2/10/- an hour. residence 5 gns. weekly. Approved M.C.A. private pilot's licence course.—Wiltshire School of Flying, Ltd., Thruxton Aerodrome, Andover, Hants.

A.F.R.Ae.S., A.R.B.Certs., A.M.I.Mech.E., etc., on "no pass, no fee" terms; over 95% successes. For details of exams and courses in all branches of aeronautical work, navigation, mechanical trades, write for 144-page handbook free. B.I.E.T. (Dept. 703), 17, Stratford Place, London, W.1. [0109

FREE! Brochure giving details of courses in all branches of aero eng., covering A.F.R.Ae.S., A.R.B. Certs., M.C.A. exams, etc. We are the only postal training college operated by an industrial organisation. write to E.M.I. Institutes Postal Division, Dept. F26, 43, Grove Park Road, London, W.4. (Associated with H.M.V.) [0026

COMMERCIAL Pilots' licences, technical "General" and C. Type-Rating, conversions. Personal instruction. Five-day full-time course for specific type. Special arrangements for urgent requirements. Particulars from Pilot, College of Aeronautical Engineering, 102A, Sydney Street, Chelsea. Flaxman 0021. Nearest stations, South Kensington and Sloane Square. [0019

SOUTHEND-ON-SEA MUNICIPAL FLYING SCHOOL, Essex. Tel.: Rochford 5626. Comprehensive training for private, commercial licences and instructor's endorsements. M.C.A. approved for 30-hour course. Tiger Moth aircraft fitted with radio. Special facilities for training in instrument ratings. Hourly rates: solo, day £3, night £4. Dual 5/- extra. Contract rate £2/10/-. Link trainer 10/-. No fees or subscriptions. Trial lesson, 20/-. [0032

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through the local office of the Ministry of Labour and National Service, etc., if the applicant is a man aged 18-64 or a woman aged 18-59 inclusive, unless he or she or the employer is excepted from the provisions of The Notification of Vacancies Order 1952.

VACANCIES FOR PILOTS AND RADIO OPERATORS

SWISSAIR are engaging for a fixed period of employment:—

(1) AIRLINE PILOTS, mainly in the capacity of co-pilots on DC-4 and Convair aircraft.
Requirements: Valid I.C.A.O. Air Line Transport Pilot Licence.
Valid R/T Licence.
Experience on European routes.

(2) RADIO OPERATORS.
Requirements: Valid I.C.A.O. Licence.
1-Class Radio Telegraphist Licence.
Radio telephony voice procedures in English.

On request, SWISSAIR, 126, Regent Street, London, W.1 (Tel. REGent 6737), will supply crew-members interested in these vacancies with a special application form. The completed forms are to be mailed directly to SWISSAIR Personnel Department, Hirschengraben 84, Zurich, Switzerland. [0053

VICKERS-ARMSTRONGS Ltd. (Aircraft Section) have vacancies at Hurn Depot for the following staff:—
AIRCRAFT STRESSMEN
DESIGN DRAUGHTSMEN
(aircraft experience preferable, but not essential)
JIG AND TOOL DRAUGHTSMEN
(aircraft experience preferable, but not essential)
JUNIOR WEIGHTS ENGINEER
(for aircraft detail work in Design Office)

APPLY, in writing, to the Employment Manager, Vickers-Armstrongs, Ltd. (Aircraft Section), Weybridge, Surrey.

APPLICATIONS, with certain exceptions, are subject to the approval of the Ministry of Labour and National Service. [0611

REQUIRED IMMEDIATELY BY WELL KNOWN AUTOMOBILE ENGINEERING FIRM IN NORTH WEST DISTRICT

Designers and Detail Draughtsmen, Jig and Tool Draughtsmen—also Planning Engineers

THESE VACANCIES OFFER GOOD CONDITIONS AND PROSPECTS TO SUITABLE APPLICANTS. SALARY ACCORDING TO AGE, EXPERIENCE AND QUALIFICATIONS

Apply Box No. 8013, c/o *Flight*

WOLVERHAMPTON AVIATION LTD.

THE LEADING LIGHT AIRCRAFT ENGINEERS. THE AIRPORT WOLVERHAMPTON

tel. FORDHOUSES 2228

THE PATHFINDER CLUB
115 Mount St., Berkeley Sq., W.1

Full club facilities and personal services are available to all serving and ex-service members of the Royal Air Force.

Details from the Secretary.
Telephone: GROsvenor 3382

AIRCRAFT SPRING WASHERS

TO B.S. SPECIFICATION S.P.47

CROSS MFG. (1938) LTD. COMBE DOWN, BATH

AUTOMOBILE ENGINEERING FIRM OF REPUTE IN NORTH WESTERN AREA HAVE IMMEDIATE VACANCIES FOR DETAIL DRAUGHTSMEN BETWEEN THE AGES OF 21 AND 25 YEARS

THESE VACANCIES OFFER GOOD TERMS AND CONDITIONS, ALSO EXCELLENT PROSPECTS FOR RIGHT TYPE OF APPLICANTS

Apply immediately to Box No. 119 c/o Flight, giving as many particulars as possible regarding experience etc.

SITUATIONS VACANT

TECHNICIANS FOR GUIDED WEAPONS

F. G. MILES, Ltd., at Redhill require technicians for development of guided weapons and other projects involving the development and application of Structural Plastics. Applicants should be of degree standard, but qualifications equivalent to Higher National would be considered. Some industrial experience is desirable but applicants must have a practical outlook. The positions hold the advantage of "getting in on the ground floor" of this new and interesting development, with excellent prospects of advancement. Vacancies exist for development engineers, draughtsmen, senior stressmen and chemist, but in all cases the position will accentuate the closest liaison between the technician and shops.

F. G. MILES, LTD.,
REDHILL AERODROME, SURREY. [0012

AUSTRALIAN MANAGER.

NORMALAIR, Ltd., Yeovil, invite applications from aeronautical engineers to assume engineering control of a recently formed subsidiary company in Melbourne, Australia, initially engaged in the maintenance and supply of pressurisation and kindred equipment. Service experience in the aircraft industry would be of the utmost advantage. There are excellent prospects of promotion and only candidates of the highest calibre and thoroughly familiar with the aircraft world will be considered.

APPLICATIONS, giving full particulars of age, training, experience, salary, etc., should be addressed to the Secretary. [0026

APPLICATIONS are invited for the following positions in the Aircraft Division of the English Electric Co.,

(1) at Warton Aerodrome, near Blackpool:—
Aeronautical engineer for work on stability and control problems. Applicants should possess an Honours Degree and have had at least three years relevant experience in aeronautics. Flying experience an advantage. Ref. 635 J.

(2) Flight observer engineer. Applicants must have at least a H.N.C. in aerodynamics. Ref. 1011A.

(3) Instrument engineer, to maintain and calibrate aircraft instruments. Applicants should be technically qualified and have good experience of this class of work. Ref. 1014.

PLEASE write, quoting appropriate reference, and giving full details, to Central Personnel Services, English Electric Co., Ltd., 24-30 Gillingham Street, London, S.W.1. [0036

ROLLS-ROYCE, Ltd., Hucknall Aerodrome, Notts, have a vacancy for stressman of degree standard or with H.N.C. in aero subjects.

APPLY by letter to Personnel Manager, stating age, experience and qualifications. [0024

FOLLAND AIRCRAFT, Ltd. require a senior weights engineer for an interesting programme of aircraft work.—Apply to the Personnel Manager, Folland Aircraft, Ltd., Hamble, Hants. [0030

THE Aircraft Design Technical Office of The Bristol Aeroplane Co., Ltd., requires the following personnel for work on an interesting range of civil and military aircraft and helicopters:—

JUNIOR and intermediate technicians for aircraft structural analysis with engineering degree or Higher National Certificate and preferably some aircraft stressing experience.

JUNIOR and intermediate technicians for engineering development laboratory with Higher National Certificate and preferably some experience of structural or general engineering test work.

JUNIOR and intermediate weights assistants, with Ordinary National Certificate or Higher National Certificate and some experience in an aircraft weights section or drawing office.

PROGRESSIVE appointments with excellent opportunities for advancement on merit.

APPLICATIONS should be sent to the Personnel Manager (Aircraft Division), The Bristol Aeroplane Co., Ltd., Filton House, Bristol. [0079

LICENSED radio engineer and radio mechanics at our base at Stansted Airport, Essex.—Apply by letter or telephone to the Senior Radio Engineer, Aviation Traders, Ltd., Southend Airport, Essex. Tel.: Rochford 56401. [0060

LICENSED aircraft engineer required in Cambridge. "A" and "C" licences with endorsement for Auster aircraft essential. Lodging accommodation arrangeable (couple only).—Write, stating full details of experience and personal particulars, to Box 2111. [0061

SENIOR technical assistant (mechanical) required for vibration research. Interesting work, five-day week.—Please write, stating age and previous experience to the Personnel Officer, the de Havilland Engine Co., Ltd., Star Lane, Edgware, Middlesex. [0033

BRITISH MESSIER, Ltd., Cheltenham Road East, Gloucester, require a senior weights engineer to run small weight section.—Please write, stating age, experience and salary required to Mr. E. G. Collinson, Chief Technician. [0016

A. AND B. licensed engineer required for appointment in Rhodesia. The position, which calls for endorsement on Dove, Dakota and Viking aircraft, will be on a contract basis. Applicants, preferably single, are invited to submit full details, in confidence, to Box 2088. [0019

JIG and tool draughtsmen, fully experienced, required by Percival Aircraft, Ltd., Luton Airport, Beds. Good working conditions and full welfare facilities, including staff pension scheme.—Applications to the Personnel Manager, stating age, experience, salary required. [0020

CHIEF flying instructor required immediately by Midland Aero Club, Elmdon Airport, Birmingham (Tel.: Shelduck 2441). Commercial Licence endorsed for Auster and Tiger Moth aircraft. Instructor rating and C.F.S. category necessary for A.T.C. commitments. Salary on R.A.F.A. scale for G.P.I. [0076

STRESSMEN, senior and junior, required for interesting work in connection with aircraft undercarriage and hydraulic equipment.—Write, stating age, experience, qualifications and salary required, to Mr. E. G. Collinson, Chief Technician, British Messier, Ltd., Cheltenham Road East, Gloucester. [0015

APPLICATIONS are invited for a post with a company engaged in airborne geophysical surveying. Applicants should have a good knowledge of radio and electronics equipment, and be prepared to go abroad on flying operations. Previous flying experience an asset.—Apply Box 2709. [0010

VACANCIES exist for planning engineers, must have considerable previous experience in either aircraft, electronics and/or light engineering industries.—Write, giving fullest particulars of age, technical qualifications, training and planning experience to: Airtech, Ltd., Aylesbury and Thame Airport, Haddenham, Bucks. [0017

APPLICATIONS are invited from design draughtsmen and stressmen, also technical assistants with combined design and performance experience for work on both reciprocating and gas turbine aero engines.—Applications should state full particulars of experience and qualifications and should be addressed to the Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edgware, Middlesex. [0002

A. V. ROE
CANADA LIMITED

A Canadian aircraft company with extensive British background requires:

SENIOR STRESSMEN

SENIOR DRAUGHTSMEN

SENIOR AERODYNAMICISTS

FLIGHT TEST ENGINEERS

and other

SPECIALIZED Personnel

This Company is foremost in progressive aircraft and engine design and manufacture in Canada, and is at present engaged on a comprehensive programme for the R.C.A.F.

The large modern plant is located on the outskirts of the predominantly English city of Toronto. The Company operates on a 5-day week, has group insurance, regular salary reviews, paid overtime, and defence housing projects are under construction in the neighbourhood of the plant.

A representative of the Company will be in England. For further particulars and an interview in your own area, please contact:

MRS. E. J. MIDDLETON
A. V. ROE CANADA REPRESENTATIVE
c/o ONTARIO DEPT. OF IMMIGRATION
12, NEW BURLINGTON STREET
LONDON, W.1.

FLYING TRAINING
TO
HIGHEST MODERN STANDARDS
FOR
Private and Commercial Pilots' Licences
Instructors' Rating

TIGER MOTH & AUSTER £3 per hour
NIGHT FLYING - - - £4 per hour

Contract Rates on Application
Ministry of Civil Aviation Approval
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THE AERODROME, CAMBRIDGE
Tel.: CAMBRIDGE 56291

SITUATIONS VACANT

TECHNICAL author required in rapidly growing department for the preparation of aeroplane landing gear and hydraulic equipment publications. Knowledge of M.o.S. procedure desirable but not essential.—Apply personally to Mr. J. R. Smith, British Messier, Ltd., Cheltenham Road East, Gloucester. [0595]

WEIGHT estimators, senior and intermediate, required by Percival Aircraft, Ltd., Luton Airport, Beds, for work on fixed wing and helicopter aircraft. Good welfare facilities, including staff pension scheme.—Apply, giving details of age, qualifications, experience and salary required, to Personnel Manager. [0592]

H. M. HOBSON, Ltd., invite applications for positions in the drawing office as follows: designers, detail and modification draughtsmen, checkers, stressmen. The work is concerned with interesting projects connected with fuel metering equipment and hydraulic flying controls for aircraft.—Hobson Works, Fordhouses, Wolverhampton. [0459]

LANCASHIRE AIRCRAFT CORPORATION, Ltd., Bovingdon Airport, Herts, require qualified pilots, navigators and radio officers for their York fleet. Only applicants holding appropriate M.C.A. licences will be considered.—Please write full details to the Personnel Manager, at above address. [0330]

PLANNING engineers (aircraft) required by Percival Aircraft, Ltd., Luton Airport, Beds. Considerable practical experience of manufacture of metal airframe components and production planning essential qualifications.—Apply to Personnel Manager, giving full details of age, qualifications, experience and salary required. [0597]

TEST laboratory assistants (male) required by Percival Aircraft, Ltd., Luton Airport, Beds. National Certificate standard and previous experience on design of test laboratory equipment desirable. Good welfare facilities, including staff pension scheme.—Applications, stating qualifications, experience, age and salary required, to Personnel Manager. [0598]

REQUIRED immediately by Percival Aircraft, Ltd., Luton Airport, Beds, several draughtsmen with comprehensive experience of engine installations and allied systems. Good welfare facilities, including staff pension scheme.—Applications, in writing, stating age, qualifications, experience and salary required, to the Personnel Manager. [0601]

APPLICATIONS are invited from senior and intermediate design draughtsmen. Experience of aero-engine design desirable, but not essential. Also checkers. —Please write, stating age and giving details of previous experience in chronological order, to the Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edgware, Middlesex. [0600]

REQUIRED immediately, electronics officer suitably qualified both able and prepared to develop specialist electronic equipment for use on guided weapons, establish and control a department. Good salary, housing accommodation provided. Preference given to applicant already living in the North Kent area.—Reply, stating age, qualifications, experience, to Box 2389. [0622]

HANDLEY PAGE (READING), LTD., The Aerodrome, Woodley, Reading, have vacancies in their design office for senior and intermediate airframe draughtsmen, a senior electrical draughtsman and senior and intermediate aerodynamicists of degree standard or with H.N.C. in aero subjects.—Please send full particulars to the Personnel Officer. [0574]

PRESS tool designers and jig designers are required by large engineering company in the Southampton area. —Applications are invited from men with the necessary tool room and draughting experience. High salary and good prospects for men with the required ability. Box Q4971, A.K. Advtg., 212a Shaftesbury Ave., London W.C.2. [0631]

CHRISTCHURCH, Hants. Applications are invited from experienced technical authors, technical illustrators and spares compilers required for the preparation of Ministry of Supply and Civil Manuals, repair schemes, etc.—Applications to Personnel Manager, The de Havilland Aircraft Co., Ltd., Airspeed Division, Christchurch, Hants. [0621]

AIR FORCE, Naval, civil and helicopter aircraft all under design and development at Percival Aircraft, Ltd., Luton Airport, Beds. Applications are invited from senior and junior draughtsmen and stressmen, for work on this interesting programme. Good welfare facilities, including staff pension scheme.—Write, giving details of experience and salary required, to Personnel Manager. [0595]

VACANCY exists for a senior estimator rate fixer to take charge of department. Candidates must have served an engineering apprenticeship and had at least four years' experience of rate fixing aircraft work as applied to incentive schemes. Salary according to experience and qualifications.—Write, giving fullest particulars of age, technical qualifications, training and rate fixing experience, to Airtech, Ltd., Aylesbury and Thame Airport, Haddenham, Bucks. [0618]

HEAD purchasing agent for an engineering company specializing in high precision electro-mechanical aircraft instrument manufacture. Applicant must be used to dealing with supply problems involved by short runs and multiplicity of types and must have had considerable experience of the purchase of specification materials. This being a senior executive position carries with it good salary, prospects and pension rights. Applicants must be prepared to reside in the Bristol area. [0623]

TEDDINGTON CONTROLS, Ltd., Cefn Coed, Brecon-shire, South Wales. [0621]

ENGLISH ELECTRIC CO., Ltd., Luton, require designers capable of working with a minimum of supervision on small mechanisms, light engineering or instruments. Higher National Certificate or equivalent desirable, practical and drawing office experience essential. Electrical knowledge an advantage. Salary according to age and experience in range £500 to £750. Please write, giving full details and quoting reference E640, to Central Personnel Services, English Electric Co., Ltd., 24-30 Gillingham Street, London, S.W.1. [0567]

TECHNICAL assistants required for interesting laboratory and field work connected with guided weapons project. Applicants should be between 20 and 25 years of age and have at least an Ordinary National Certificate (mechanical or electrical) or its equivalent. Experience of work on servo systems or hydraulic equipment would be of value. Applications, giving details of qualifications and experience, should be sent to the Personnel Manager, Bristol Aeroplane Co., Ltd., Aircraft Division, Filton House, Bristol. [0625]

CHRISTCHURCH, Hants. A vacancy exists for a position as an assistant designer on a new and interesting project. Candidates must have had at least seven years' drawing office experience in the design of main structural components of aircraft, and must possess initiative in dealing with new problems and original development work. A practical knowledge of fundamental stressing and of structural testing is most desirable. The position offered is a responsible one with good prospects, involving the control of a D.O. Section employed on prototype work. An attractive salary will be given to the right person.—Applications should be addressed to Chief Designer, The de Havilland Aircraft Co., Ltd., Airspeed Division, Christchurch, Hants. [0594]

GLOSTER AIRCRAFT
CO., LTD.
HUCCLECOTE · GLOUCESTER

The following **VACANCIES** exist on progressive projects of advanced interest:—

STRESSMEN
Senior and Intermediate.
WEIGHTSMEN
Senior and Junior.
DRAUGHTSMEN
Structural and Electrical.

Previous aircraft experience an advantage but not essential

Prospects are excellent for energetic and sound applicants

APPLICATIONS to be addressed to the **CHIEF DESIGNER** giving particulars of **Experience, Age and Salary**

DOWTY EQUIPMENT LIMITED
require first class sound

PRACTICAL ENGINEERS
preferably with some experience of design, development and testing of jet engine accessories, particularly flow, acceleration and speed governing controls, burners and pumps. Exceptional prospects of advancement.

SENIOR DRAUGHTSMEN
required for development work on fuel systems. Experience on light hydraulic or pneumatic controls acceptable.

SENIOR DRAUGHTSMEN
for hydraulic and undercarriage department also required, and

JIG & TOOL DRAUGHTSMAN
Important positions with prospects.

The Company's conditions are exceptionally good; there is a realistic pension scheme and the environment is ideal.

The Company employs a Housing Officer who will render every assistance.

Write, preferably in tabulated form, to
PERSONNEL MANAGER,
DOWTY EQUIPMENT LTD.
Arle Court, Cheltenham

SAUNDERS-ROE
LIMITED

require a

Senior Technical Engineer

with a First Class Degree, or equivalent qualifications, for interesting work at their Helicopter Division.

Previous experience on rotary wings is not essential.

Assistance will be given to the selected candidate in obtaining suitable housing accommodation.

Staff Assurance Scheme in operation.

Applications giving details of experience salary expected, etc., should be addressed to:—

THE PERSONNEL OFFICER
SAUNDERS - ROE LIMITED
SOUTHAMPTON AIRPORT
EASTLEIGH, HANTS

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ARMSTRONG SIDDELEY MOTORS have vacancies in their Sub-Contract Department for men who can deal capably with sub-contractors on sheet metal work for gas turbines. One technical assistant is required preferably with experience in gas turbine or aircraft sheet metal work. Also a sheet metal section leader able to progress sub-contracts and still more importantly a vacancy exists for a chief of the progress section whose responsibility would be the efficient following up of all contract progress work. This man needs to be fully experienced. A vacancy also exists on the jig and tool control side of the sub-contract department for an assistant chief—preferably a man who has served a toolmaker's apprenticeship and has full experience on jigs, tools, fixtures and gauges.—Apply in the first instance to Personnel Manager, Armstrong Siddeley, Coventry. Reference SQ.1. [8002

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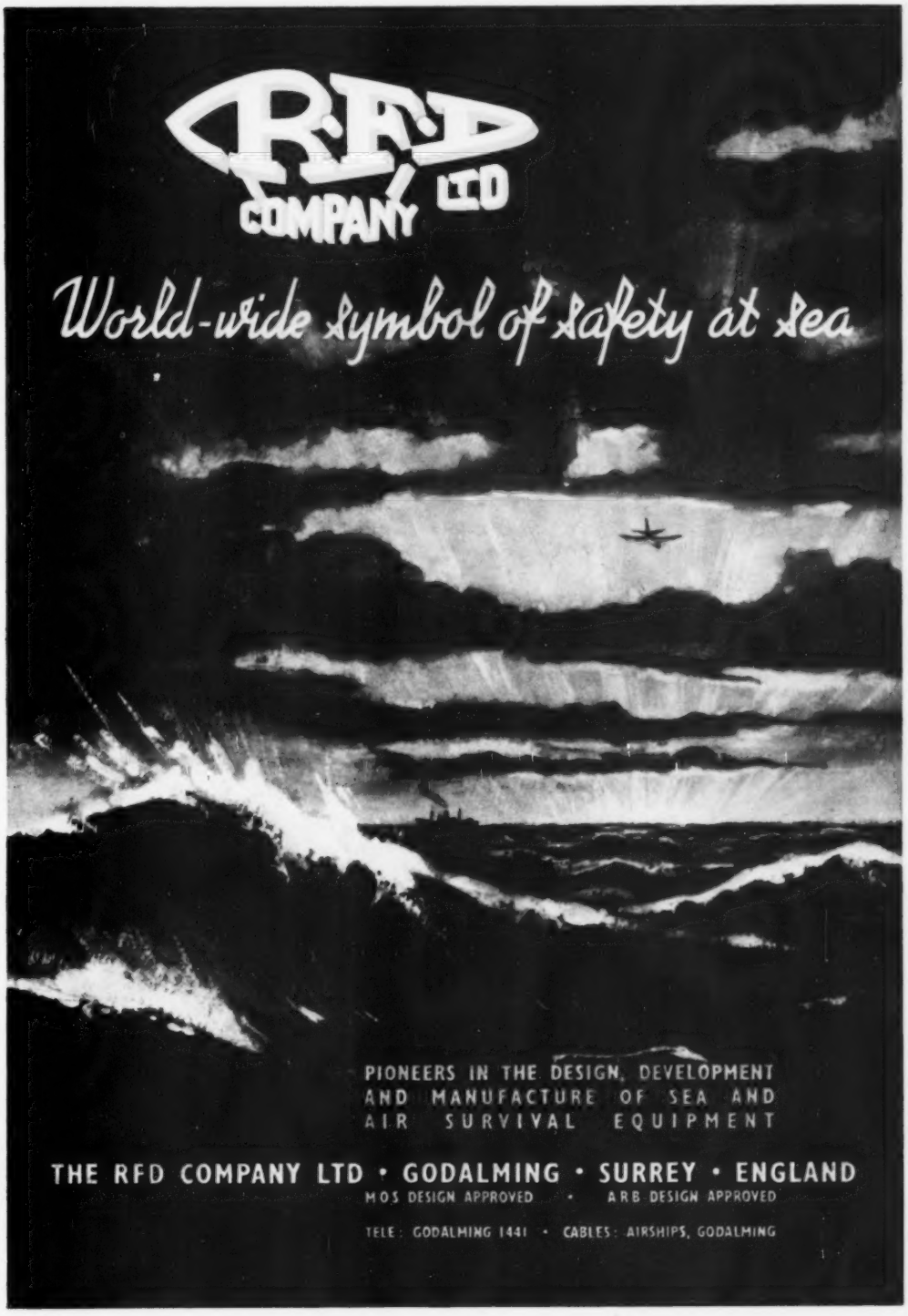
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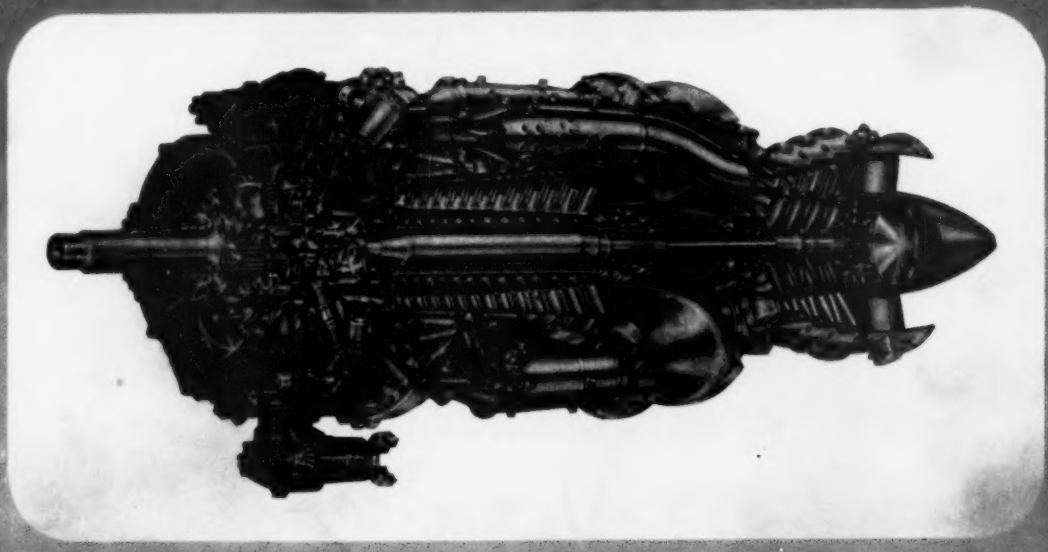

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